302
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Admiral	Ch. 20AX5, A, B, D, EZ, F, GZ, 20X5, B, GZ Tel. Rec., Prod. Chg. Bul. 142	302-1
ADMIRAL	Ch. 20Y4-B-F-L. 20Y3-E-F. Mod. C-A 23-F25	302-13S
Cadillac	7265825, 7265845	302-2
Capehart	Chassis CX-38C Series Tel. Rec.	302-3
Chevrolet	987187	302-4
CROSLEY	J-21C-T-L Ch. 472-473.	302-13S
Dumont	Ch. RA-312, RA-313 Tel. Rec.	302-5
Motorola	CTA4	302-6
Motorola	24T2, B, Y24T2, B (Ch. TS-609, Y) Tel. Rec.	302-7
Newcomb	D-12	302-8
Packard-Bell	24203, U, 24205, U (Ch. T20) Tel. Rec.	302-9
Pilot	AF-850	302-10
Stewart-Warner	21C-9700W, WB, X, XB, 21T-9700R, RB Tel. Rec.	302-11
SYLVANIA	21C401-21T101-21T104 Ch. 1-532-1-2	302-14S
V-M	954B Record Changer	302-12

PHOTOFACT* Folder

RETMA MEMBER

CAPEHART
CHASSIS CX-38C Series

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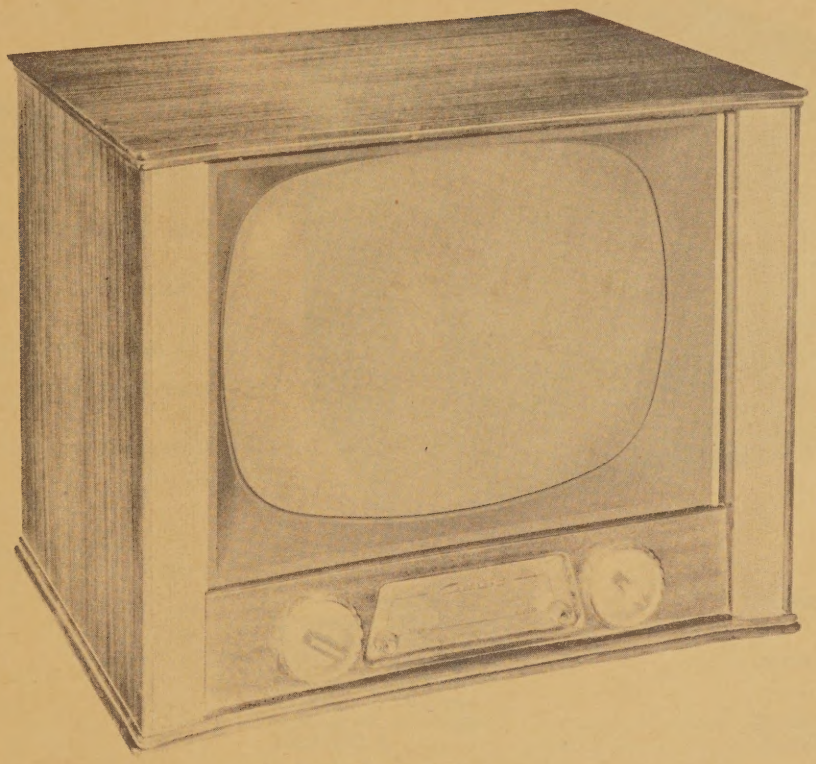

CAPEHART MODEL 23T215MD-5

TRADE NAME	Capehart	MODELS	CHASSIS
		21T215BD-4, 21T215MD-4 22C215BD-4, 22C215MD-4, 23T215BD-4, 23T215MD-4	CX-38C-4
		21T215BD-5, 21T215MD-5, 22C215BD-5, 22C215MD-5, 23T215BD-5, 23T215MD-5	CX-38C-5
		24T215BNL-6	CX-38C-6
MANUFACTURER	Capehart-Farnsworth Corp., Fort Wayne, Indiana		
TYPE SET	Television Receiver		
TUBES	Twenty		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.68 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 16
Parts List and Descriptions ..... 11 thru 14
Photographs
- Cabinet-Rear View 16
- Capacitor Identification 3, 10
- Chassis-Top View 14
- RF Tuner 6, 16
- Resistor Identification 4, 9

Photographs (Cont)
- Trans., Inductor & Alignment Identification 7

Resistance Measurements 8
Servicing in the Field 1
Schematic (Alternate Tuner) 15
Schematic (TV) 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

CAPEHART
CHASSIS CX-38C Series

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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CAPEHART
CHASSIS CX-38C Series

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 10 push-on type control knobs and UHF dial from front panel of cabinet.

2. Loosen 7 wood screws and remove 1 metal screw . Lift rear cover up and remove.

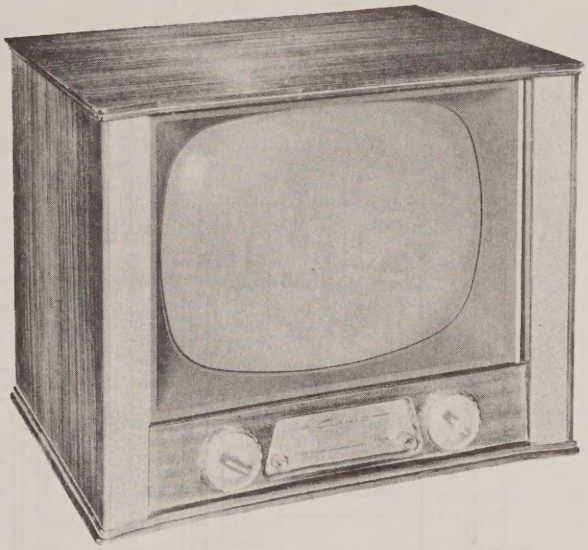
3. Loosen 2 wood screws and slip antenna bracket off.

4. Disconnect speaker leads. (To connect speakers see schematic on page 2.).

5. Remove 4 wood screws holding picture tube braces to rear of cabinet.

6. Remove 4 chassis bolts. Remove chassis.

7. Remove 6 speaker nuts. Remove 3 speakers.



MODELS	CHASSIS
21T215BD-4, 21T215MD-4, 22C215BD-4, 22C215MD-4, 23T215BD-4, 23T215MD-4	CX-38C-4
21T215BD-5, 21T215MD-5, 22C215BD-5, 22C215MD-5, 23T215BD-5, 23T215MD-5	CX-38C-5
24T215BNL-6	CX-38C-6

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF tuner oscillator circuit may be accomplished by removing rear cover and supply power to set. Adjustments are located at the top rear of tuner chassis. Set fine tuning control to the center of its range. Set channel selector to highest high-band channel (7-13) operating in the area and adjust A14 (high-band oscillator adjustment) for best picture detail. Set channel selector to highest low band channel (2-6) operating in the area and adjust A15 (low band oscillator adjustment) for best picture detail. Check other channels and readjust if necessary.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 wood screws holding wood molding strip located on the top edge of the safety glass. Remove wood modling and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

SPECIAL ADJUSTMENTS - PICTURE LOCK ADJUSTMENT

Adjustment of the picture lock control is located on the rear panel of the chassis. Tune in a TV station, preferably strongest in that area.

Rotate the picture lock control (R9) to its maximum clockwise position. While observing the picture rotate R9 slowly counter clockwise until picture starts to shift to the left. Rotate R9 back clockwise to the position just prior to the point where the picture starts to shift to the left.
In extreme noisy and weak signal areas, adjustment of R9 should be made along with other sync adjustments for stable horizontal and vertical sync.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Remove the rear cover and supply power to the set. Set the horizontal hold control to the center of its range and adjust the horizontal oscillator ringing slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the noise rejection control (R10) located on rear panel of the chassis for minimum buzz.

FUSES

Three fuses are used. One for filament circuit protection, one for LV power supply protection and one for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

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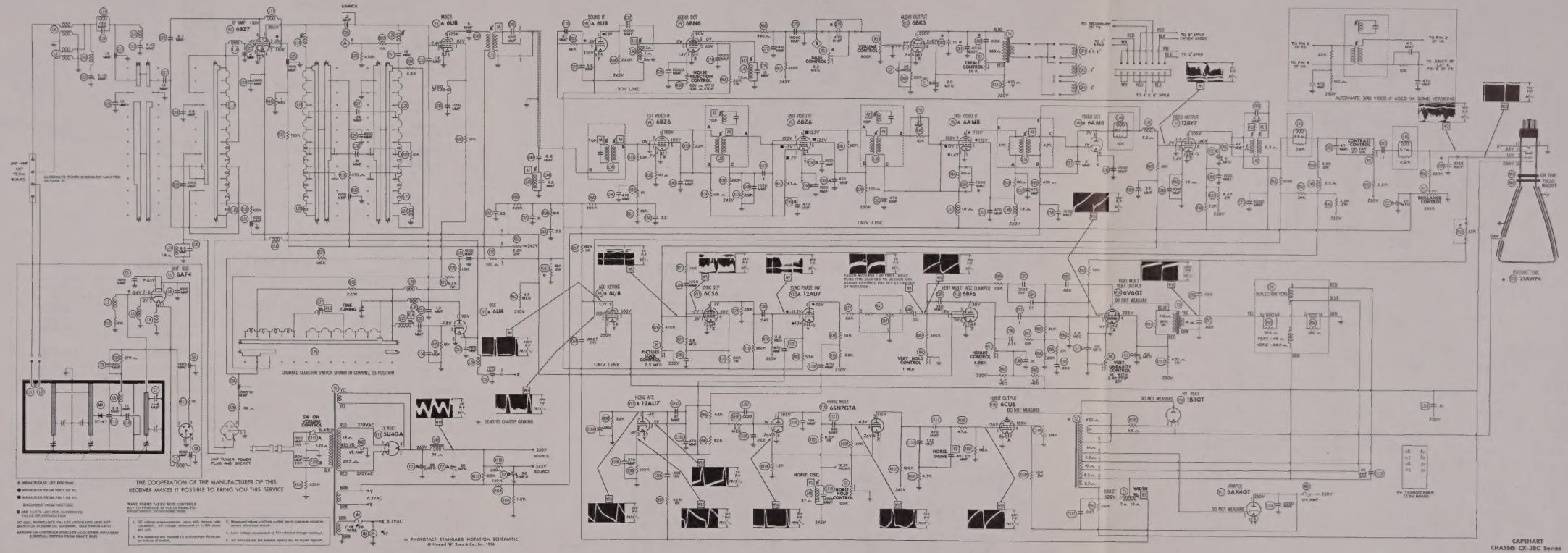
CAPEHART
CHASSIS CX-38C Series
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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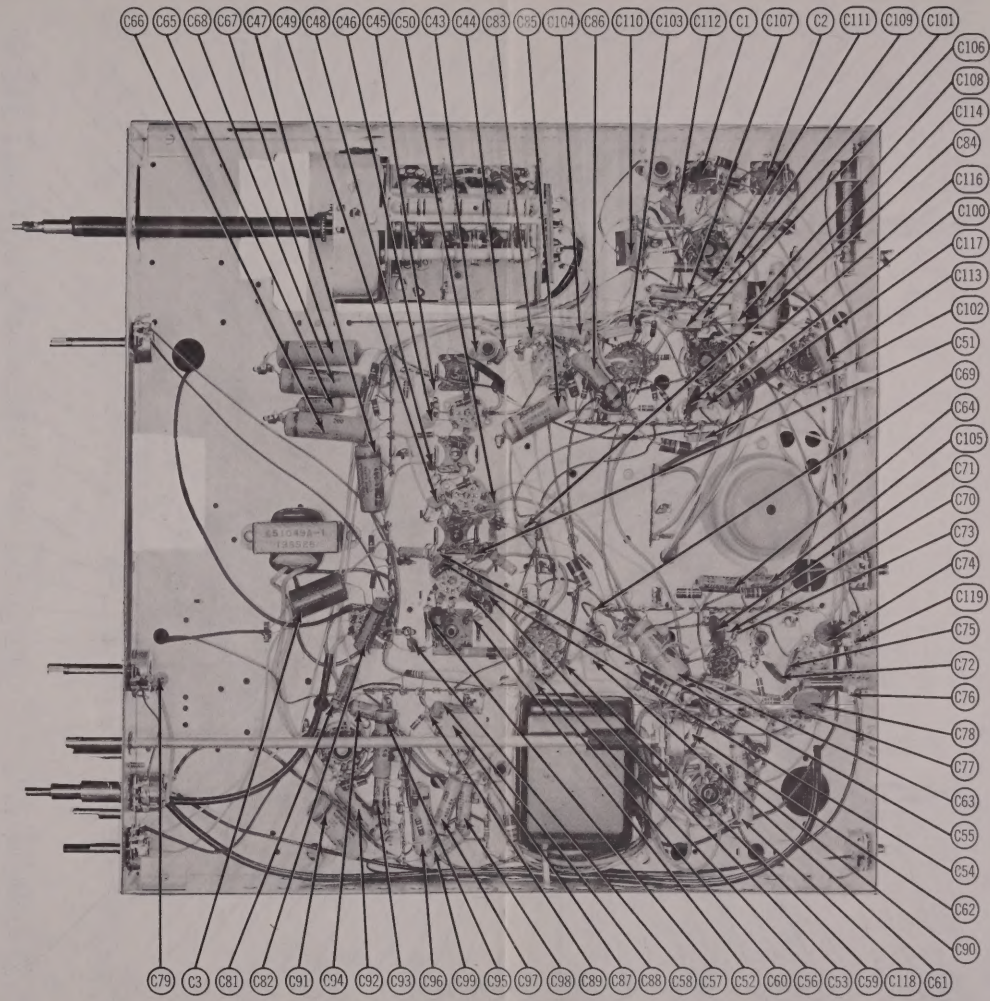

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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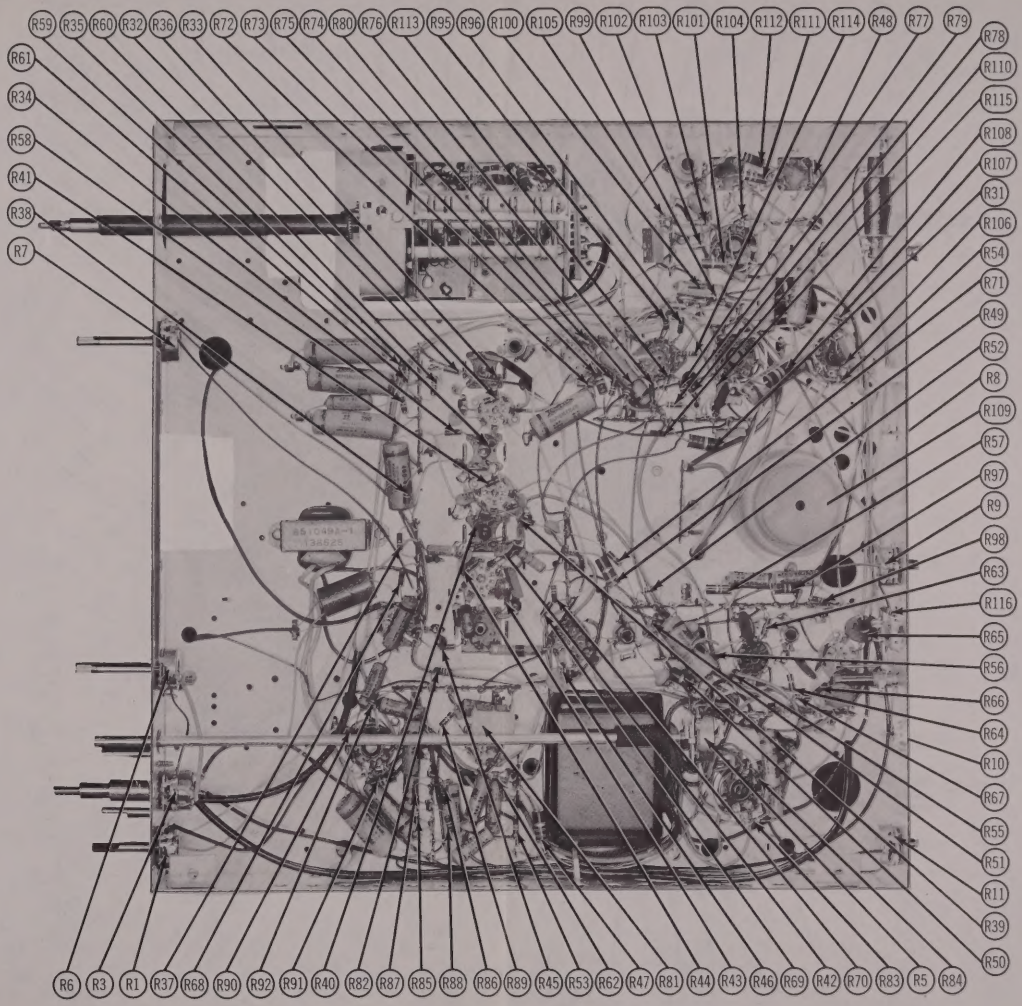

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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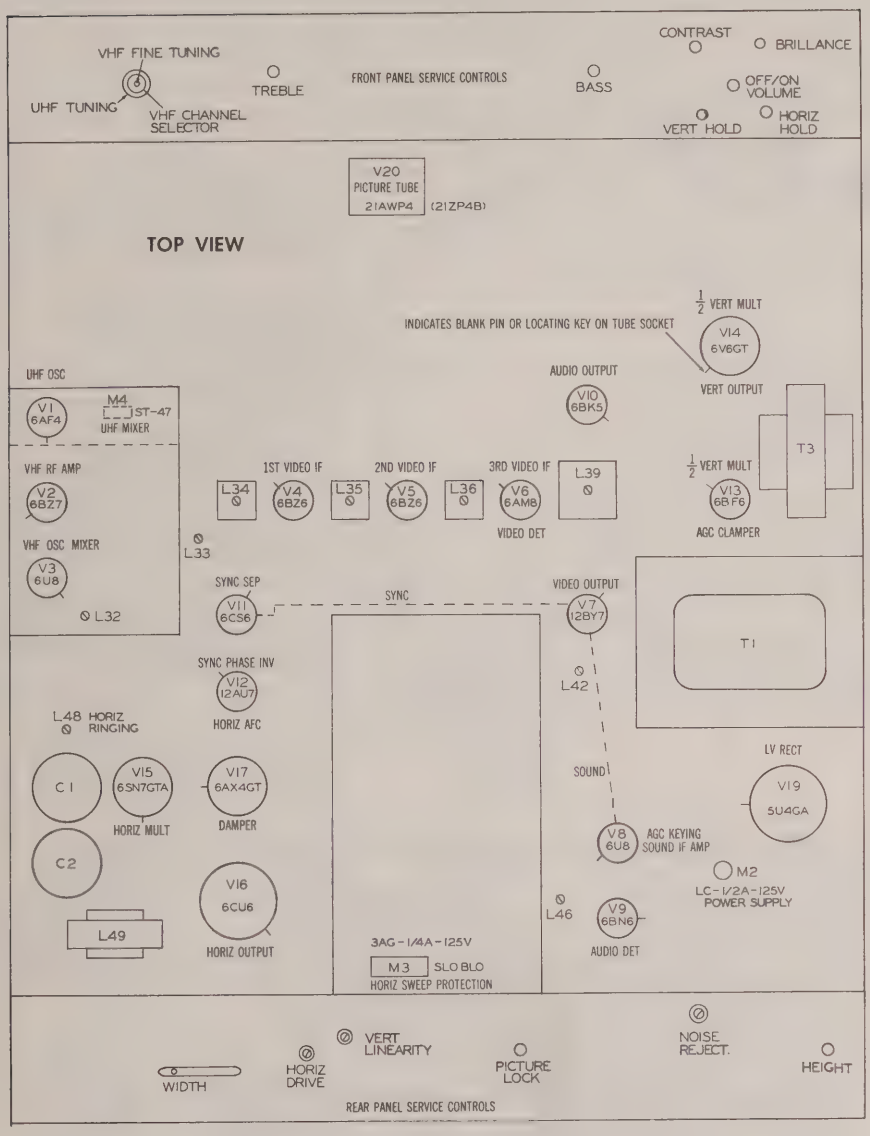
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V19, Fuse (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7 (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V7, V8, V20**
Has pic, no sound - **V8, V9, V10**
Overloaded picture - **V8, V13**

SYNC FAILURE
No vert. sync - **V12, V13, V14**
No horiz. sync - **V12, V15**
No vert. or horiz. sync - **V11, V12**

SWEEP FAILURE
No raster, has sound - **V15, V16, V17, V18, V20, Fuse (M3)**
No vertical deflection - **V13, V14**
Poor vert. linearity or foldover - **V13, V14**
Poor horiz. linearity or foldover - **V15, V16, V17**
Narrow picture - **V15, V16, V17, V18, V19**
Vert. off freq. - **V12, V13, V14**
Horiz. off freq. - **V12, V15**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal multivibrator tube (V15) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the AGC keying tube (V8) from its socket. Connect the negative lead of a 3 volt battery to the ungrounded side of C68.
Connect the positive lead to chassis.
Connect a clip lead from pin 5 of V13 to chassis.
Use high sweep generator output to make trap adjustments A1, A2, A6 and A7 visible on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD Capacitor	High side thru .001MFD to pin 1 (grid) of 6BZ6 (V4). Low side to chassis.	44MC (10MC Swp)	41.25MC	Any	Vert. Amp. thru 10KΩ to pin 2 (grid) of 12BY7 (V7). Low side to chassis.	A1	Disconnect shielded tuner lead from terminal "D" of L34. If a separate marker generator is used, couple it loosely thru 10KΩ to pin 1 of V4. Adjust for MINIMUM response at marker frequency.
2.	"	"	"	47.25MC	"	"	A2	"
3.	"	"	"	44.1MC	"	"	A3	Attenuate sweep generator output for normal response on scope. Adjust A3 for maximum marker amplitude with MINIMUM tilt.
4.	"	"	"	43.5MC	"	"	A4	Adjust A4 to position 43.5MC marker within 50% of maximum amplitude on response curve.
5.	"	"	"	45.75MC	"	"	A5	Adjust A5 to position 45.75MC marker within 50% of maximum amplitude on response curve. Repeat steps 1 thru 5. Reconnect shielded tuner lead to terminal "D" of L34.
6.	"	High side thru .001MFD to point Ⓐ (on back of tuner terminal). Low side to chassis.	"	47.25MC	Any non-interfering channel	"	A6	Adjust for MINIMUM response at 47.25MC marker frequency.
7.	"	"	"	39.75MC	"	"	A7	Adjust for MINIMUM response at 39.75MC marker frequency.
8.	Two 130Ω Carbon Resistors	Across VHF antenna terminals with 130Ω in each lead.	189MC (10MC Swp)	187.25MC 191.75MC	9	Vert. Amp. thru 10KΩ to pin 2 (grid) of 12BY7 (V7). Low side to chassis.		Adjust fine tuning control until sound marker falls in trap. (Fig. 1).
9.	"	"	"	"	"	Vert. Amp. thru detector (Fig.3) to pin 5 and 6 of 6BZ6 (V4). Low side to chassis.	A8, A9	Connect a clip lead across pin 5 (plate) and pin 6 (screen) of V5. Adjust A8 and A9 for response curve similar to Fig. 1. Adjust for maximum amplitude and minimum tilt to position of video marker. Remove short across pins 5 and 6 of V5.
10.	Direct	High side to an ungrounded tube shield over converter tube (V3). Low side to chassis.	44MC (10MC Swp.)	39.75MC 41.25MC 43.25MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru 10KΩ to pin 2 (grid) of 12BY7 (V7). Low side to chassis.		Check for response similar to Fig. 2. If necessary SLIGHTLY retouch A3 thru A9 for desired response. A1 and A2 should not be retouched. Remove short from pin 5 of V13. Remove bias supply. Replace V8 in its socket.

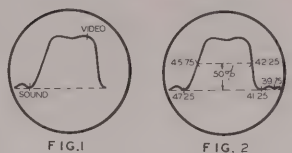


FIG.1

FIG. 2

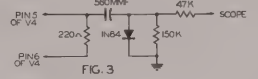


FIG. 3

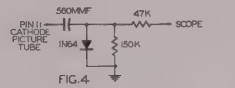


FIG.4

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR, FM SIGNAL GENERATOR AND OSCILLOSCOPE

Preset the noise rejection control (R10) 90 degrees from maximum clockwise rotation.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.001MFD	High side to pin 2 (grid) of 12BY7 (V7). Low side to chassis.	Not used	4.5MC (400∿Mod)	Any	Vert. Amp. thru detector (Fig.4) to pin 11 (cathode) of picture tube. Low side to chassis.	A10, A11	Connect a clip lead across terminals "B" and "C" of L35. Adjust A10 and A11 for MINIMUM 400∿ indication on scope.
12.	"	"	4.5MC (400∿Mod) (50KC Swp)	4.5MC	"	Vert. Amp. to point Ⓑ. Low side to chassis.	A13	Adjust for maximum 400∿ indication on scope. Two peaks will be noted when adjusting A13. Adjust for peak with maximum amplitude.
13.	"	"	"	"	"	"	A13, A11	Attenuate generator output so that signal level is below limiting level of the 6BN6 as evidenced by background hiss and noise. Adjust A13 and A11 for maximum response on scope.
14.	"	"	Not used	4.5MC (400∿Mod)	"	"	R10	Use high signal generator output and adjust R10 for MINIMUM 400∿ indication on scope.
15.	"	"	4.5MC (400∿Mod) (50KC Swp)	4.5MC	"	"	A13	Retouch A13 for maximum 400∿ indication on scope. Use low generator output. Remove short from L35. Tune in strongest station in that area and adjust R10 for MINIMUM buzz and hiss. Tune in strongest station in that area and adjust A13 for clearest sound.

VHF OSCILLATOR ADJUSTMENT FOR TUNER #850338A-1

Set the fine tuning control to the center of its range. Set the channel selector to the highest high band channel (7-13) station operating in that area. Adjust the high band oscillator adjustment (A14) for best picture detail.
Set the channel selector switch to the highest low channel (2-5) operating in the area. Adjust the low band adjustment (A15) for best picture detail.
Recheck the setting of A14, if it has changed repeat entire procedure.

VHF RF AND MIXER ALIGNMENT FOR TUNER #850338A-1

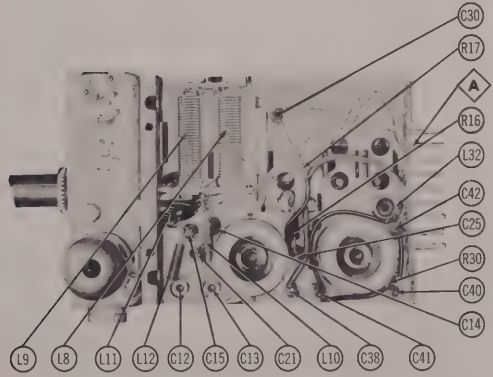
The RF and Mixer portion of this tuner has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

UHF TUNER ALIGNMENT FOR TUNER #750593A-1

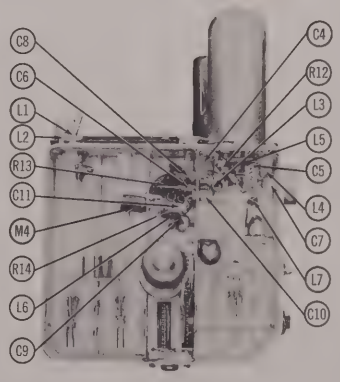
In the event the UHF oscillator tube is replaced, it is recommended that several tubes and the one which works best should be used. Alignment of the tuner should not be required in the field.

VHF TUNER ALIGNMENT FOR TUNER #850356A-1

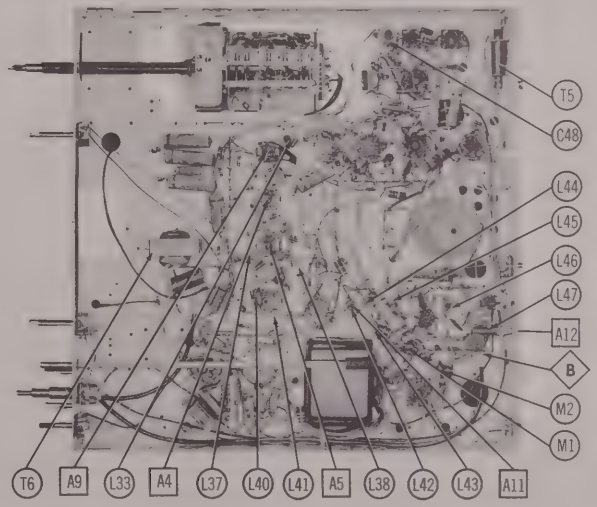
This tuner portion has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.



RF TUNER TOP VIEW



UHF TUNER FRONT VIEW



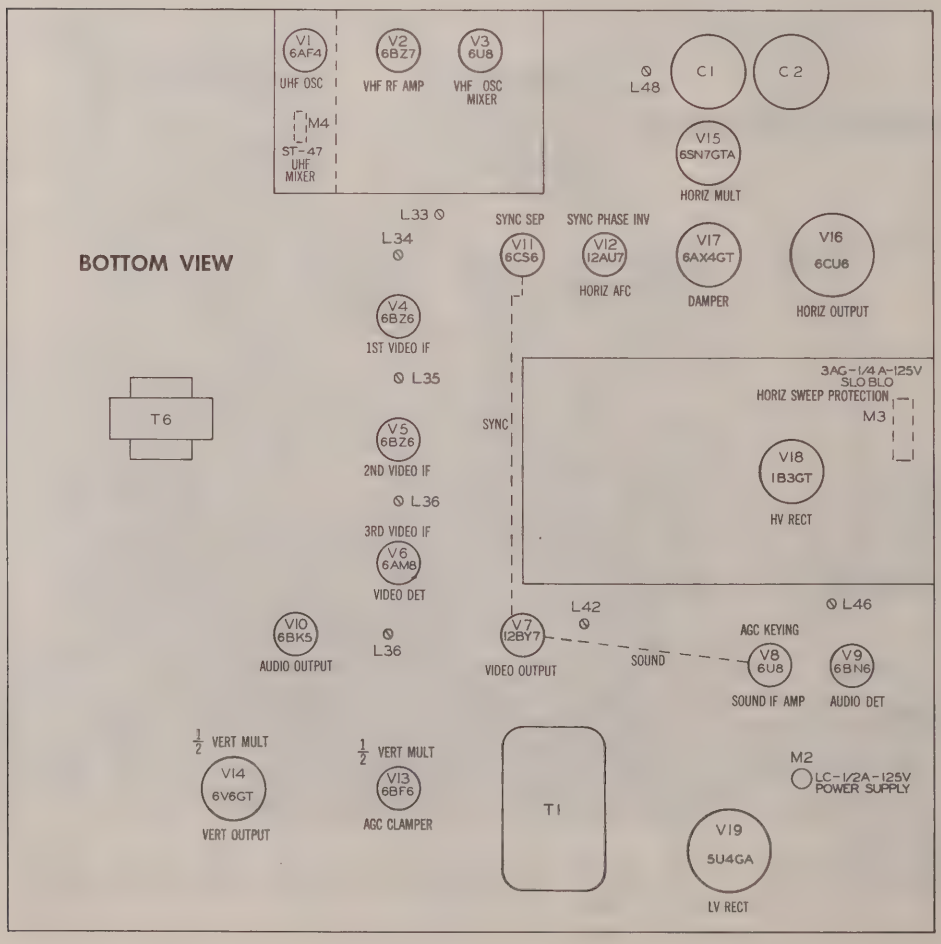
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

CAPEHART
CHASSIS CX-38C Series

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	*■4. 8KΩ	10KΩ	. 1Ω	0Ω	0Ω	10KΩ	*■4. 8KΩ		
V 2	6BZ7	†3KΩ	460KΩ	INF	. 1Ω	0Ω	INF	1. 3Meg	0Ω	0Ω
V 3	6U8	■1. 6KΩ	480KΩ	■14KΩ	. 1Ω	0Ω	■100Ω	0Ω	0Ω	15KΩ
V 4	6BZ6	60KΩ	47Ω	. 1Ω	0Ω	▲100Ω	▲100Ω	0Ω		
V 5	6BZ6	140KΩ	▲47Ω	†75KΩ	†75KΩ	†155Ω	†155Ω	INF		
V 6	6AM8	■100Ω	70KΩ	†56Ω	. 1Ω	0Ω	†155Ω	1. 7KΩ	6. 8KΩ	70KΩ
V 7	12BY7	39Ω	6. 8KΩ	0Ω	. 1Ω	. 1Ω	0Ω	†5KΩ	†8. 2KΩ	0Ω
V 8	6U8	†220KΩ	†35KΩ	▲22KΩ	†75KΩ	†75KΩ	650KΩ	†56Ω	70KΩ	125KΩ
V 9	6BN6	350Ω	4. 2Ω	0Ω	. 1Ω	■22KΩ	7. 3Ω	†330KΩ		
V 10	6BK5	†L 1KΩ	TP	150KΩ	0Ω	. 1Ω	220Ω	150KΩ	†525Ω	TP
V 11	6CS6	25KΩ	0Ω	0Ω	. 1Ω	■200KΩ	■22KΩ	6Meg		
V 12	12AU7	22KΩ	260KΩ	100KΩ	†75KΩ	†75KΩ	†14KΩ	†2. 2Meg	■3. 9K	†75KΩ
V 13	6BF6	500KΩ	0Ω	0Ω	. 1Ω	1. 3Meg	1. 3Meg	▲4. 5Meg		
V 14	6V6GT	NC	. 1Ω	†1KΩ	†555Ω	2. 2Meg	NC	0Ω	500Ω	
V 15	6SN7GTA	2. 5Meg	†8. 5KΩ	1. 2KΩ	90KΩ	†120KΩ	1. 2KΩ	. 1Ω	0Ω	
V 16	6CU6	TP	. 1Ω	TP	†10KΩ	1Meg	TP	0Ω	0Ω	TOP CAP ▲16Ω
V 17	6AX4GT	TP	NC	4. 5Meg	NC	†56Ω	TP	†75KΩ	†75KΩ	
V 18	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲465Ω
V 19	5U4GA	TP	70KΩ	TP	2 1Ω	TP	19Ω	NC	70KΩ	
V 20	21AWP4	0Ω	55KΩ	PINS 10 ▲22KΩ	PIN 11 ■320KΩ	PIN 12 . 1Ω				

† MEASURED FROM PIN 2 OF V9.
*MEASURED IN UHF POSITION.
■MEASURED FROM 130V LINE.
▲MEASURED FROM PIN 7 OF V5.
▲MEASURED FROM PIN 3 OF V17.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CAPEHART PART No.	STANDARD REPLACEMENT		
V1	UHF Osc.	6AF4	6AF4	7DK	
V2	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Mixer - Osc.	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6BZ6	6BZ6	7CM	
V5	2nd. Video IF Amp.	6BZ6	6BZ6	7CM	
V6	3rd. Video IF Amp.- Video Detector	6AM8	6AM8	9CY	
V7	Video Output	12BY7	12BY7	9BF	
V8	Keyed AGC- Sound IF Amp.	6U8	6U8	9AE	
V9	Audio Detector	6BN6	6BN6	7DF	
V10	Audio Output	6BK5	6BK5	9BQ	
V11	Sync Separator	6CS6	6CS6	7CH	
V12	Sync Phase Inv.- Horiz. AFC	12AU7	12AU7	9A	
V13	Vert. Mult.- AGC Clamper	6BF6	6BF6	7BT	
V14	Vert. Mult.- Vert. Output	6V6GT	6V6GT	7AC	
V15	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V16	Horiz. Output	6CU6	6CU6	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4GA	5U4GA	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	CAPEHART PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V20	21AWP4 ① 21ZP4B ① 21ZP4A	21AWP4 ① 21ZP4B ① 21ZP4A	 21ZP4B ① 21ZP4A	21AWP4 ② 21ZP4B ② 21ZP4A	21AWP4 ① 21ZP4B ① 21ZP4A	12N 12N 12N	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CAPEHART PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲50	350	850352A-1	FP420.47	TM-604020-350	T-110	
B	▲20	350		TC36	TD-100-50	MTH-5010	
C	■40	350					
D	100	50					
C2A	▲50	350	850352A-2	FP454.2	TM-604020-350	Q-380	
B	■30	350				MT-2520	
C	▲8	250			TD-8-250		
D	20	200					
C3	25	25	650228A-7	TC26	TD-25-25	MT-0225	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CAPEHART PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C4	1000			DD-102	801-001	DC-521	
C5	1000			DD-102	801-001	DC-521	
C6	1000			MFT-1000			
C7	1-4			829-4	3115-01-10	CT551	
C8	1000			MFT-1000			
C9	1000			DD-102	801-001	DC-521	
C10	1.1			TCZ-1	NP0A-010		
C11	3.3						
C12	5-10						
C13	5-10						
C14	150			DD-151	GP2K-151	UC-5315	
C15	15						
C16	15			DD-150	GP1K-150	UC-5415	
C17	15			DD-150	GP1K-150	UC-5415	
C18	6.8			TCZ-6R8	NP0A-6R8	ZT-5568	
C19	1000			DD-102	801-001	DC-521	
C20	6.8			TCZ-6R8	NP0A-6R8	ZT-5568	
C21	1000			MFT-1000			
C22	4						
C23	2.7						
C24	1000			DD-102	801-001	DC-521	
C25	1000			MFT-1000			
C26	.3						
C27	.56						
C28	.91						
C29	1000			DD-102	801-001	DC-521	
C30	1000			MFT-1000			
C31	15			DD-150	831-150	UC-5415	
C32	1.2						
C33	1.5						
C34	10						
C35	10						
C36	1000			MFT-1000			
C37	1000			DD-102	801-001	DC-521	
C38	1000			MFT-1000			
C39	1000			DD-102	801-001	DC-521	
C40	5						
C41	1000			MFT-1000			
C42	1000			DD-102	801-001	DC-521	
C43	8.2				NP0A-8R2		
C44	22			TCZ-22	NP0K-220		
C45	1000		450469A-5	DD-102	801-001	DC-521	
C46	470		450469A-11	DD-471	831-471	UC-5347	
C47	.1	400	2247-1040	DF-104		PT401	
C48	1000		450469A-5	DD-102	801-001	DC-521	
C49A	470		650858A-1	DD-471	831-471	UC-5347	
B	470			DD-471	831-471	UC-5347	

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA CAPEHART PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C50A	1000		600881A-9	DD2-102	812-001	DCD-521	
B	1000						
C51	47		2371-9223	TCZ-47	NP0-338-470		
C53	470		450468A-11	DD-471	831-471	UC-5347	
C53	470	500	2373-31471	D6-471	831-471	MCE545	
C54	1000		450468A-5	DD-102	801-001	DC-531	Note 1
C55	470		450468A-11	DD-471	831-471	UC-5347	
C56	1000		450468A-5	DD-102	801-001	DC-531	
C57	5		450030A-1	D6-050	GPIK-050	Z7-555	
C58	1000		450468A-5	DD-102	801-001	DC-531	
C59	1000		450468A-5	DD-102	801-001	DC-531	
C60	5000		600881A-7	DD-502	811-005	DC-535	
C61	47		450030A-17	TCM-47	NT50E-470	NT-5447	
C62	47		450030A-17	TCM-47	NT50E-470	NT-5447	
C63	.1	400	2347-1040	DF-104		PT401	
C64	.0027	1000	2349-2739	MD-273			
C65	.01	300	2346-1039	D6-103	GPS-333-103	PT411	
C66	.01	300	2346-2340			PT4G33	
C67	.22	300	2346-2240			PT4G22	
C68	.15	200	2346-2340			PT4G33	
C69	3.3		450030A-5	TCZ-3R3	NP0A-3R3	Z7-5533	
C70	47		450030A-17	TCM-47	NT50E-470	NT-5447	
C71	10000		600881A-8	DD-103	811-01	DC-541	
C72	10000		600881A-8	DD-103	811-01	DC-541	
C73	3.3		450030A-31				
C74	10000		600881A-8	DD-103	811-01	DC-541	
C75	10000		600881A-8	DD-103	811-01	DC-541	
C76	10		450030A-18	TCA-10	N330A-100		
C77	1000		450468A-5	DD-102	801-001	DC-531	
C78	10000		600881A-8	DD-103	811-01	DC-541	
C79	470			DD-471	831-471	UC-5347	Note 4
C80	.01	600	2348-1039	D6-103	GPS-333-103	PT411	Note 2
C81	.0033	600		D6-332	GPS-333-332	PT4133	Note 4
C83	.033	600		DF-303	817-G3	PT4133	Note 4
C84	27		2371-9022	TCZ-27	NP0L-270		
C84	1000		600881A-5	DD-102	801-0015	DC-5315	
C85	.1	400	2347-1040	DF-104		PT401	
C86	.047	400	2347-4730	DF-503		PT4G47	
C87			453314A-1	PC-104			
C88	.001	600	2348-1039	D6-102	GP2L-102	PT321	
C89	.390	500	2372-23391	D6-391	831-391	MCE545	
C90	.01	600	2348-1039	D6-103	GP2-333-103	PT411	
C91	.1	400	2347-1040	DF-104		PT401	
C92	.022	600	2346-2239	DF-203	817-02	PT4122	
C93	.0027	1000	2349-2739	MD-273			
C94	.01	300	2346-1039	D6-103	GPS-333-103	PT411	
C95	.068	200	2346-6839				
C96	.033	500	2346-3339				
C97	.022	200	2346-2230	DF-303	817-G3	PT4133	
C98	.022	200	2346-2230	DF-303	817-G3	PT4122	
C99	.0022	500		D6-222	GP2-333-222	MCR223	Note 3
C100	470	500	2372-21471	D6-471	GP2K-471	MC245	
C101	470	500	2372-21471	D6-471	GP2K-471	MC245	
C102	470	500	2372-21471	D6-471	GP2K-471	MC245	
C103	47	500	2372-21470	DD-470	831-470	MC220	
C104	.0022	200	2346-2230	D6-222	GP2-333-222	PT5223	
C105	.001	1000	2349-1029	DD-102	IR5KV-102	PT1821	
C106	270	500	2372-21271	D6-271	GP2K-271	MC241	
C107	.0022	500	2346-2230	D6-222	GP2-333-222	PT5223	
C108	.022	300	2346-2230	DF-303	817-G3	PT4122	
C109	100	500	2372-21101	D6-101	801-101	MCE235	
C110	4700	500	2372-23472			MCE565	
C111	390	500	2372-23391	D6-391	831-391	MCE543	
C112	330	500	2372-21331	D6-331	831-331	MC245	
C113	470	500	2372-21471	D6-471	831-471	MCE245	
C114	.047	400	2347-4730	DF-503		PT4G47	
C115	56	3000	450954A-9	DD3G-560	3KV-560	DC30456	
C116	10000		600881A-8	DD-103	811-01	DC-541	
C117	.047	600	2346-4730	DF-503		PT4G47	
C118	.01	600	2348-1039	D6-103	GP2-333-103	PT411	
C118A	1500	1000	453821A-4	DD-152	IR5KV-152	DC30215	
B	1500	1000		DD-152	IR5KV-152	DC30215	

Note 1. Not used in chassis coded R1 or R4.
Note 2. Used only when tone controls are not installed.
Note 3. Not used in chassis coded R1.
Note 4. Used only when tone controls are installed.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	300KΩ	½	850341A-9	B-66	A47-300K-S	QH1-139	TA354L	Brilliance
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A.
R2A	100KΩ	½	850341A-8	B-60	A47-100K-S	QH1-138	TA16L	Horizontal Hold
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	500KΩ	½	850341A-11	AB-58	A47-500K-S			Volume
B	Shaft		Not Req.	AK-3	FS-3			Attach to R3A
C	Switch		Not Req.	KB-1	SWE-12			Attach to R3A
R4A	1Meg	½	850341A-7	B-69	A47-1Meg-S	QH1-157	TA16L	Vertical Hold
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R4A.
R5A	15KΩ	½	850341A-10	ABT-154	Q17-15K			Contrast (Tap at 10KΩ)
B	Shaft		Not Req.	AK-6	NQ			Attach to R5A.
R6A	3.2Meg	½	850341A-13	AB-855		QH7-140		Base
B	Shaft		Not Req.	AK-4		Not Req.		Attach to R6A.
R7A	50KΩ	½	850341A-14	AB-31	A47-50K-S	QH1-123	TA54L	Treble
B	Shaft		Not Req.	AK-4	KSB-3	Not Req.	Not Req.	Attach to R7A.
R8	3000Ω	2	850842A-13		39-3000			Vertical Linearity (Wire Wound) (Fixed minimum of 400Ω)
R9A	2.5Meg	½	850777A-1	BX-83	A47-2.5Meg-S	QH1-239	TA255L	Picture Lock
B	Shaft		Not Req.	Not Req.	FSR-1/4	Not Req.	Not Req.	Attach to R9A.
R10	650Ω	2	850842A-12		39-700-200			Noise Rejection (Wire Wound) (Fixed minimum of 150Ω)
R11A	5Meg	½	850341A-12	AB-87	A47-5Meg-S	QH1-142	TA56L	Height
B	Shaft		Not Req.	AK-1	FSR-1/4	Not Req.	Not Req.	Attach to R11A.

* Connect a 400Ω resistor in series with the control terminal, and the lead connecting to the same terminal of the original control.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	NOTES
R13	10KΩ	½	3229-103		
R14	100KΩ	½	3229-104		
R15	100KΩ	½	3229-104		
R16	1Meg 5%	½	3238-105		
R17	750KΩ 5%	½		BTS-750K 5%	
R18	470Ω	½	3229-471	BTS-470	
R19	15KΩ	½			
R20	220KΩ	½	3229-224		
R21	2200Ω	1	3232-222	BTA-2200	
R22	10KΩ	½	3229-103		
R23	470KΩ	½	3229-474		
R24	6800Ω	½			
R25	10KΩ	½	3229-103		
R26	10KΩ	½	3229-103		
R27	150KΩ	½			
R28	470Ω	½		BTS-56	
R29	1500Ω	½		BTS-1500	
R30	100Ω	½	3229-101	BTS-100	
R31	2200Ω	1	3232-222	BTA-2200	
R32	1000Ω	½	3229-102	BTS-1000	
R33	3300Ω	½	3229-333		
R34	100Ω	½	3229-101	BTS-100	
R35	22KΩ	½	3229-223		
R36	47Ω	½	3229-470	BTS-47	
R37	220KΩ 5%	½	3238-224		
R38	220KΩ 5%	½	3238-224		
R39	100Ω	½	3229-101	BTS-100	
R40	22KΩ	½	3229-223		
R41	47Ω	½	3229-470	BTS-47	
R42	10KΩ	½	3229-103		
R43	100Ω	½	3229-101	BTS-100	
R44	100Ω	½	3229-101	BTS-100	
R45	47Ω	½	3229-471	BTS-470	
R46	33Ω	½	3229-330	BTS-39	
R47	8200Ω	2	453477A-5		
R48	2200Ω	2	3232-223	BTS-2200	
R49	3300Ω	2	6502S2A-7		
R50	3300Ω	2	6502S2A-7		
R51	100KΩ	½	3229-104		
R52	39KΩ	½	3229-395		
R53	22KΩ	½	3229-223		Note 1
R54	22KΩ	½	3229-223		
R55	2200Ω	½	3229-222	BTS-2200	
R56	220KΩ	½	3238-224		
R57	22KΩ	½	3229-223		
R58	10KΩ	½	3229-103		
R59	820KΩ 5%	½	3229-824		
R60	560KΩ	½	3229-564		
R61	56KΩ	½	3229-563		
R62	4.7Meg 5%	½	3238-475		
R63	56KΩ	½	3229-563	BTS-56K	
R64	330KΩ	½	3229-334	BTS-330K	
R65	22KΩ	1	3232-223	BTA-22K	
R66	680Ω	½	3229-681	BTS-680	
R67	330KΩ	½	3229-334	BTS-330K	
R68	220Ω	½	3229-221	BTS-220	
R69	18KΩ	½	3229-183		
R70	470KΩ	½	3229-474		
R71	10KΩ	½	3229-103		
R72	5.6MΩ	½	3229-565		
R73	22KΩ	½	3229-223		
R74	220KΩ	½	3229-224		
R75	560KΩ	½	3229-564		
R76	2.2MΩ	½	3229-225		
R77	22KΩ	½	3229-223		
R78	10KΩ	½	3229-103		
R79	330KΩ	½	3229-334		
R80	3900Ω	½	3229-392		
R81			453314A-1		
R82	390KΩ	½	3229-394		
R83	2.2MΩ	½	3229-225		
R84	2.2MΩ	½	3229-225		
R85	56KΩ	½	3229-563		
R86	12KΩ	½	3229-123		
R87	10KΩ	½	3229-103		
R88	120KΩ	½	3229-124		
R89	100KΩ	½	3229-104		
R90	2.2MΩ	½	3229-225		
R91	56KΩ	½	3229-563		
R92	33KΩ	½	3229-333		
R93	560Ω	½			
R94	560Ω	½			
R95	82KΩ	½	3229-823		
R96	82KΩ	½	3229-823		
R97	82KΩ	½	3229-823		
R98	22KΩ	½	3229-223		
R99	100KΩ	½	3229-104		
R100	2.2MΩ	½	3229-225		
R101	8200Ω	½	3232-822		
R102	470Ω	½	3229-471		
R103	120KΩ	½	3229-124		
R104	1200Ω	½	3229-123		
R105	4700Ω	½	3229-472		
R106	47Ω	½	3229-470		
R107	1Meg	½	3229-105		
R108	10KΩ	½	3238-103		
R109	6.8Ω	½	6900L6A-23	BW½-6.8	
R110	220Ω	½	3229-221	BTS-220	
R111	470Ω	1	3235-471	BTA-470	
R112	470Ω	1	3235-471	BTA-470	
R113	100KΩ	½	3229-104	BTS-100K	
R114	180KΩ	½	3229-184	BTS-180K	
R115	1200Ω	½	3229-122	BTS-1200	
R116	330KΩ	2	3232-334	BTS-330K	
R117	33KΩ	2		BTS-33K	Note 3

Note 1. Used in chassis coded R1.
Note 2. Used only when burnt timer (Part #850556A-1) is used.

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA CAPEHART PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Stancor PART No	Thordarson PART No	Triad PART No
T1	117VAC ① 1.6A	546VCT .170ADC	5VAC ② 8A	850300B-7	P9999 ①			P-8322 ①	26R00 ②	
		SEC. 3	SEC. 4	SEC. 5						
		6.3VAC ② 2.25A	6.3VAC ② 5.8A							

① Parallel and phase two smaller 6.3V windings.
② Tape 5V ② 6A winding parallel and phase three 6.3V ② 8A windings for Sec. #4.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA CAPEHART PART No.	Halldorson PART No.	Merit PART No	RCA TYPE No.	Ram PART No	Stancor PART No.	Thordarson PART No	Triad PART No
T2	Horiz. Output Trans.	850349B-1 ① 850434A-1 ②	FB41 ③	HVO-2 ③	23G21 ③	X086 ③	A-8265 ③	FLY-24 ③ 26R00 ④	D-19 ③
T3	Vert. Output Trans.	7503534C-2	21S02	A-5038	204T2 ⑤	V305	A-8143	26S63	A-96X
T4A	Yoke-Horiz. (Black)	850350B-1	DF602 ⑥	MDF-72 ⑥	21J12 ⑥		D1-4A ⑥	Y-4 ⑥	Y-17
T4B	Vert. (44MH)					Y702T2 ⑥			
T5	Width Coil (1.34.1MH) AGC Tap (2.2-16.5 MH)	851049B-1	RF800 ⑦ ⑧	MWC-1 ⑦ ⑧	216R1 ⑦ ⑧	20R14 ⑦ ⑧	WC-5 ⑦ ⑧	WC-20 ⑦ ⑧	WC-11 ⑦ ⑧

① Drill new mounting hole(s).
② Remove horizontal damping network.
③ Connect terminals #3 and #4 across terminals #1 and #2 on horizontal output transformers. Connect terminals #3 and #4 to AGC and chassis, reverse #3 and #4 if picture is out of phase.
④ Connect coded orange and black terminals to #1 and #2 on horizontal output transformer, connect coded red and blue terminals to AGC and chassis reverse red and blue leads if picture is out of phase.
⑤ Connect terminals "A" and "B" to #1 and #2 on horizontal output transformer, connect terminals "C" and "E" to AGC and chassis, reverse "C" and "E" if picture is out of phase.
⑥ Connect outer winding to terminals #1 and #2 on horizontal output transformer, connect inner winding to AGC and chassis, reverse inner winding terminals if picture is out of phase.
⑦ Connect terminals #1 and #2 to terminals #1 and #2 on horizonal output transformer, connect terminals #3 and #4 to AGC and chassis. Reverse #3 and #4 if picture is out of phase.
⑧ Alternate Capehart part number.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	9	9	9	9	9	9	9
	4	8	8	8	Jumper 8 & 7	8	8	Jumper 8 & 7
	3	5	5	5	5 or 4	5	5	5
	5	See Note ①	See Note ②	See Note ③	See Note ④	See Note ⑤	See Note ⑥	See Note ⑦
	2	3	3	3	3	3	3	3
	1	1	1	1	1	1	1	1
Connect Width Coil Across	2 & 1	3 & 1	3 & 1	3 & 1	3 & 1	3 & 1	3 & 1	3 & 1
Special Notes		①	②	③	④	⑤	⑥	⑦

① No connection to transformer. Connect a damping capacitor (approximately 47-68MMF ② 2KV) across horizontal yoke terminals #3 and #7. Add a 100Ω, ½ watt resistor in series with this capacitor if necessary to reduce yoke ringing.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA CAPEHART PART No.	Halldorson PART No	Merit PART No	Stancor PART No.	Thordarson PART No	Triad PART No	NOTES
T6	6.8KΩ	2.5Ω	851049A-1	21006	A-2901	A-3849	24S51	S-53X	

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V	C	IMP	REPLACEMENT DATA CAPEHART PART No	QUAM PART No.	NOTES
SP1	3"	PM	3.4Ω			851079A-1 ①		① Used in models 23T215MD-4, 23T215BD-4, 23T215MD-5, and 23T215BD-5.
SP2	3"	PM	3.4Ω			851079A-2 ②		② Used in models 21T215MD-5, 21T215MD-4, 21T215BD-4, 21T215MD-5, 21T215BT-5
SP3	4"x 6"	PM	3.4Ω			750762A-1 ③ 750702A-1 ③		③ Used in models 23C215MD-4, 23C215MD-5, and 23C215BD-5
						750703A-1 ③ 750888A-1 ④		④ Used in model 24T215BNL-6

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA CAPEHART PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1	UHF Ant. Coil	0Ω						
L2	UHF Ant. Coil	0Ω						
L3	Fil. Choke	0Ω						
L4	Fil. Choke	0Ω						
L5	Cathode Choke	0Ω						
L6	RF Coil	0Ω						
L7	RF Choke	0Ω						
L8	VHF Ant. Matching Trans.	.6Ω	.8Ω					
L9	VHF Ant. Matching Trans.	.6Ω	.8Ω					
L10	IF Trap	.2Ω						
L11	FM Trap	0Ω						
L12	IF Trap	.3Ω						
L13	VHF Ant. Coils	0Ω						
L14	VHF Ant. Coil	0Ω						Channel 13
L15	UHF Lf Coil	0Ω						
L16	Fil. Choke	0Ω						
L17	Neut. Coil	0Ω						
L18	VHF RF Coil	0Ω						Channel 13
L19	VHF RF Coils	0Ω						
L20	UHF D Coil	0Ω						
L21	VHF Mixer Grid Coil	0Ω						Channel 13
L22	VHF Mixer Grid Coils	0Ω						
L23	UHF IF Coil	0Ω						
L24	RF Choke	0Ω						
L25	VHF Osc. Coil	0Ω						Channel 13
L26	VHF Osc. Coils	0Ω						Channel 6
L27	UHF Osc. Coil	0Ω						
L28	RF Coil	0Ω						
L29	Fil. Choke	0Ω						
L30	RF Coil	0Ω						
L31	RF Choke	1.6Ω						
L32	Conv. Plate	.1Ω	0Ω					
L33	39.75MC Trap	0Ω		650948C-1			6225	
L34	1st Video IF	.1Ω		750460D-1	17-5003*	TV-128*	6233*	Includes 47.25MC Trap.
L35	2nd Video IF	.1Ω	.1Ω	650492D-1	17-5003*	TV-127*	6232*	Includes 41.25MC Trap.
L36	3rd Video IF	.1Ω	.1Ω	750461E-1	17-5003*	TV-128*	6233*	Includes 47.25MC Trap.
L37	RF Choke	1.8Ω		450338A-4	19-1002		4606	2.2 Microhenries, IRC Part No. CLA
L38	RF Choke	1.8Ω		450338A-4	19-1002		4606	2.2 Microhenries, IRC Part No CLA Includes a 47K & 4.7KΩ resistor
L39	4th Video IF	.1Ω	.1Ω	750865B-1				
L40	Shunt Peaking Coil	10.5Ω		750597A-1	19-3160*	TV-184*	6180*	150 Microhenries, Wound on 10KΩ 1W resistor
L41	Series Peaking Coil	8.2Ω		450338A-5	19-1005		4612	10 Microhenries, IRC Part No. CL-1
L42	4.5MC Trap 2nd Sound IF	3.3Ω		650929A-1				
L43	Series Peaking Coil	6.8Ω		750597A-3	19-3125*		6183*	140 Microhenries, Wound on 5.6KΩ resistor
L44	Shunt Peaking Coil	5.5Ω		750597A-4	19-6301	TV-184	6184	200 Microhenries
L45	Series Peaking Coil	3.7Ω		750597A-3	19-3100*	TV-181*	6177*	100 Microhenries, Wound on 3.3KΩ resistor
L46	2nd Sound IF	4.3Ω		850358B-1	17-3413			Tapped ② .8Ω & 1.5Ω

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA MEISSNER PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA MILLER PART No.	NOTES
L47	Quadrature Coil	7.3Ω		650776A-1	20-1005	TV-151	1480	
L48	Horiz. Osc.	57Ω		650637B-1	19-1576	TV-163	6210	

* Use adaptor plate & drill mounting holes. Use one winding.
■ Use adaptor plate & drill mounting holes.
▲ Parallel with 10KΩ 1 watt resistor.
● Parallel with 5.6KΩ resistor.
♦ Parallel with 2.2KΩ resistor.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA CAPEHART PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L49	.270ADC	56Ω	1HY	650215A-5	C5037 ①	C-2996 ①	C-2326 ①	26C44 ①	C-17X ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA CAPEHART PART No. FUSE	CAPEHART PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	1" Piece of #26 wire							
M2	LC	½A 125V			323.500		MDL½ with 9936-104 Cap.	
M3	3AG P/T	1/4A 125V	450183A-3		315.250 (3AG P/T 1/4A)		GJV 1/4	

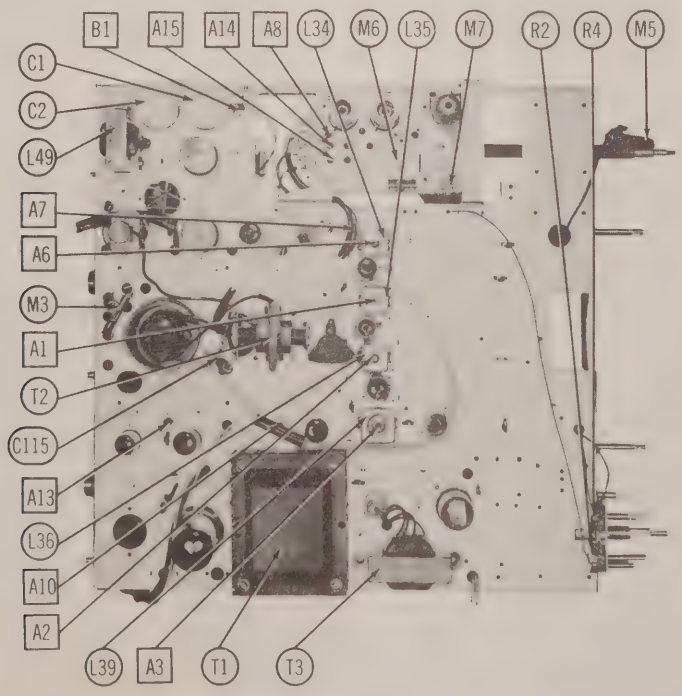
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA SYLVANIA PART No.	NOTES
M4	ST-47		1N82 or 1N82A	UHF Mixer

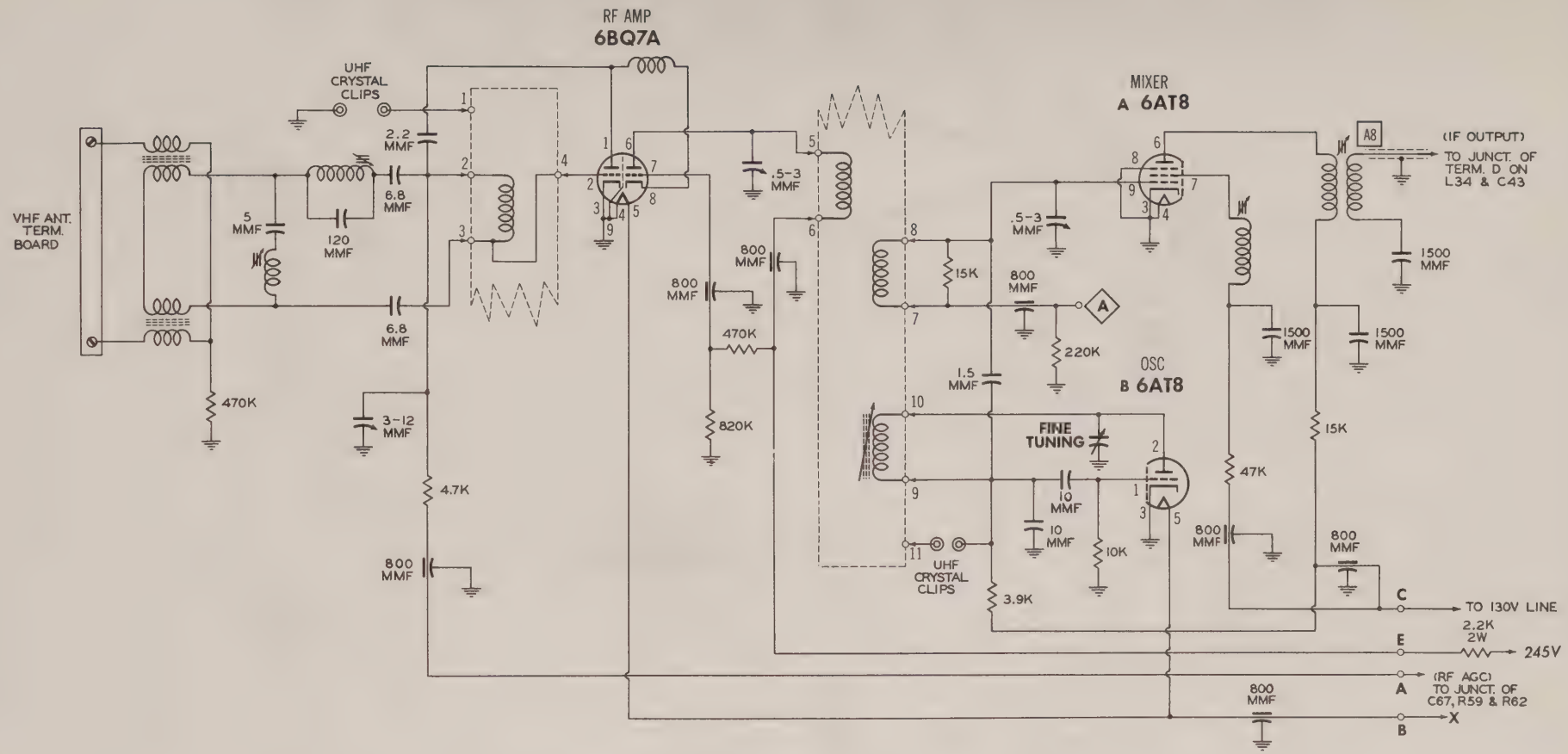
MISCELLANEOUS

ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M5	Dial Light		#47
M6	Tuner	850330A-1*	VHF-Chassis CX-38C-5, CX-38C-4
	Tuner	850356A-1	VHF-Chassis CX-38C-6
M7	Tuner	750593A-1	UHF-Chassis CX-38C-5
M8	Focus Magnet	85029IA-1	Includes Centering Device
M9	Ion Trap	650276A-5	
B2	Trimmer Cap.	450527B-1	Horiz. Drive (40-370MMF)
	Safety Glass	850223A-14	Chassis CX-38C-4, CX-38C-5
	Safety Glass	850223A-15	Chassis CX-38C-6
	Mask	950319B-2	

* Combination VHF-UHF tuner Part No. 750594A-G1 used in chassis CX-38C-5 (combines VHF tuner, Part No. 850330A-1 & UHF tuner Part No. 750593A-1).



CHASSIS TOP VIEW



VHF TUNER PART NO. 850356 A-1 USED WITH CHASSIS CX-38C-6

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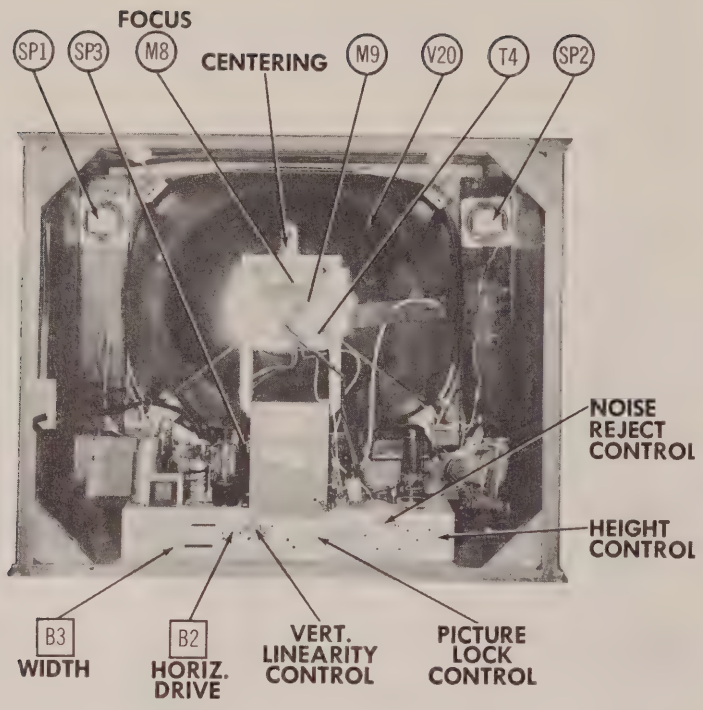
ALTERNATE VHF TUNER SCHEMATIC



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

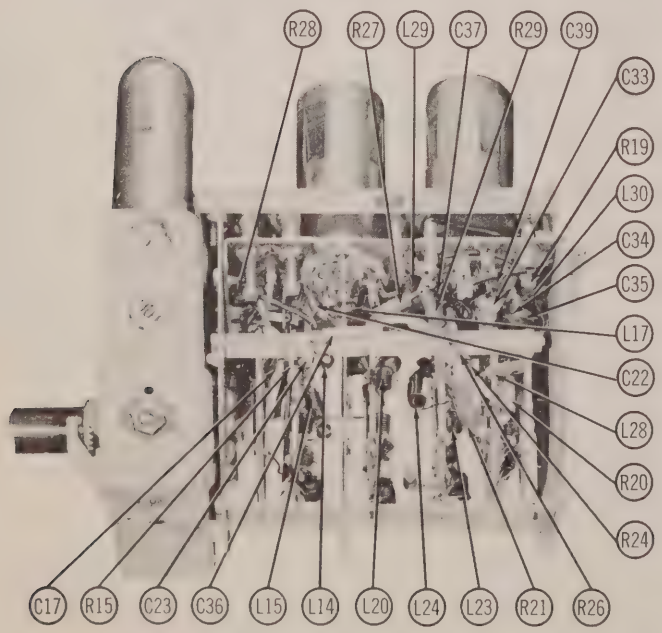
Turn the set on and tune in a TV station, preferably a test pattern.

1. Connect a .1MFD/600 volt capacitor from junction of L48, R101 and C110. Connect other end to chassis. A blue lead is brought from this junction to spare lug in HV cage to connect capacitor.

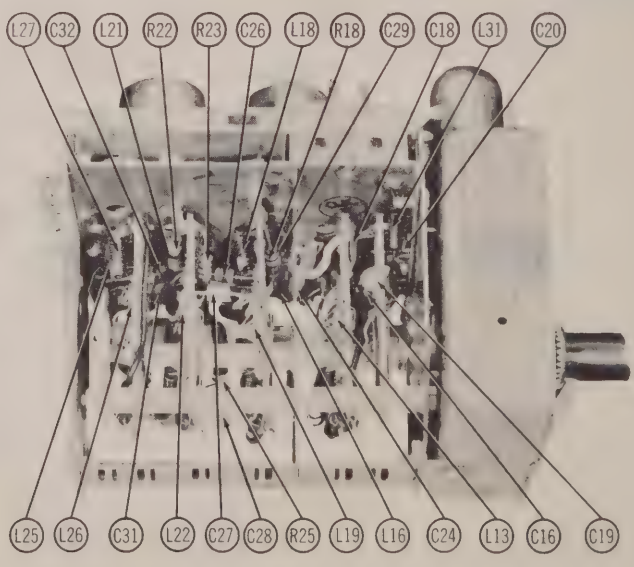
2. Adjust the horizontal hold control until picture synchronizes horizontally. Set the horizontal hold control so that approximately 1/4" between the right edge of the raster and right edge of the picture can be seen. Adjust the contrast control counter clockwise and move the picture off center to observe this condition.

3. Remove .1MFD/600 volt capacitor from junction of L48, R101 and C110, and adjust the horizontal oscillator ringing slug (B1) to again provide approximately 1/4" between the right edge of the raster and right edge of picture.

4. Switch off channel and back again; picture should remain locked in sync. If necessary, repeat steps 1 thru 4 until proper horizontal sync is obtained. Recenter picture to normal position.
Adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of white vertical lines or compression near center of the picture. Adjust the horizontal width slug (B3) for a picture slightly wider than necessary to fill the picture mask horizontally. If B2 and B3 are adjusted an excessive amount steps 1 thru 4 above should be rechecked.



RF TUNER RIGHT SIDE



RF TUNER LEFT SIDE

PROPERTY OF
L.T. BLANKENSHIP
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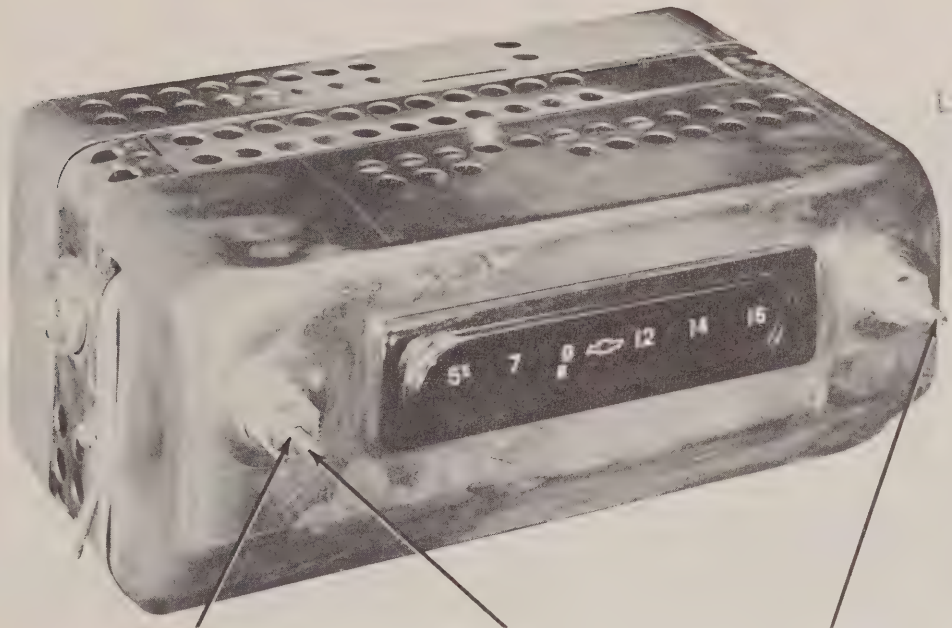
CHEVROLET
MODEL 987187



CHEVROLET
MODEL 987187

TRADE NAME	Chevrolet Model 987187 (For all 1955 Chevrolet Trucks)
MANUFACTURER	Chevrolet Motor Div., General Motors Corp., Detroit, Michigan
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Six)	Types: 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 12V6GT Output, 0Z4 Rectifier
POWER SUPPLY	12 Volt Storage Battery — RATING 2.8 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Set tone control to "treble".

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	262KC (400∿Mod)	High freq. end stop.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	82MMF	Thru dummy to ant. receptacle.	1615KC	"	"	A5, A6, A7	Check A8 (osc. coil). Rear of core should be 1 25/32" from the mounting end of coil form. Then adjust A5, A6, and A7 in order given for maximum output.
3.	"	"	1000KC	Tune to 1000KC signal	"	A9, A10	Adjust for maximum output.
4.	"	"	1615KC	High freq. end stop.	"	A6, A7	Readjust for maximum output.
5.	"	"	900KC	Tune to 900KC signal	"		If necessary, adjust dial pointer on dial cord to coincide to 900KC mark on dial.

With receiver installed, antenna fully extended and tuned to weak station between 600 and 1000KC adjust A7 for maximum volume.

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PARTS LIST AND DESCRIPTIONS

CHEVROLET
Model 987187

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CHEVROLET PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	12BA6	12BA6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amplifier	12BA6	12BA6	7BK	
V4	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V5	Output	12V6GT	12V6GT	7AC	
V6	Rectifier	0Z4	0Z4	4R	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CHEVROLET PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■20	400	6309	FP234	TM-D20-450	D-215	
B	▲20	400					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CHEVROLET PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.05	200	6537	DF-503		PT415	
C3A	15		726581l	DD-150	831-150		
B	39			DD-390	831-390		
C4	180	500	7257424	TCZ-180	NP0-334-180		
C5	.05	400	6537	DF-503		PT415	
C6	.01	600	6533	D6-103	GP3-333-103	PT6ll	
C7	2000		6352	DD-202	801-002	DC-522	
C8	.01	600	6354	D6-103	GP3-333-103	PT6ll	
C9	2000		6352	DD-202	801-002	DC-522	
C10	.006	800	H-602			PT1626	
C11	.008	1600	H-802	DD-802		PT1628	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CHEVROLET PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2.5Meg	½	7266193	F1-79		QJ-811A †	UE1893S	Tone - Panel
B	300KΩ	½		R2-35				Volume-Rear-attach to R1A
C	Bushing			AK-27				Attach to R1A
D	Switch			KB-7				Attach to R1B

† CONCENTRIKIT EQUIVALENT: K-8 KIT, BASE ELEMENTS & SHAFTS B13-140, P14-029 (Panel)
B13-132, R1-108 (Rear)
76-2 (SWITCH)
538 (BUSHING)

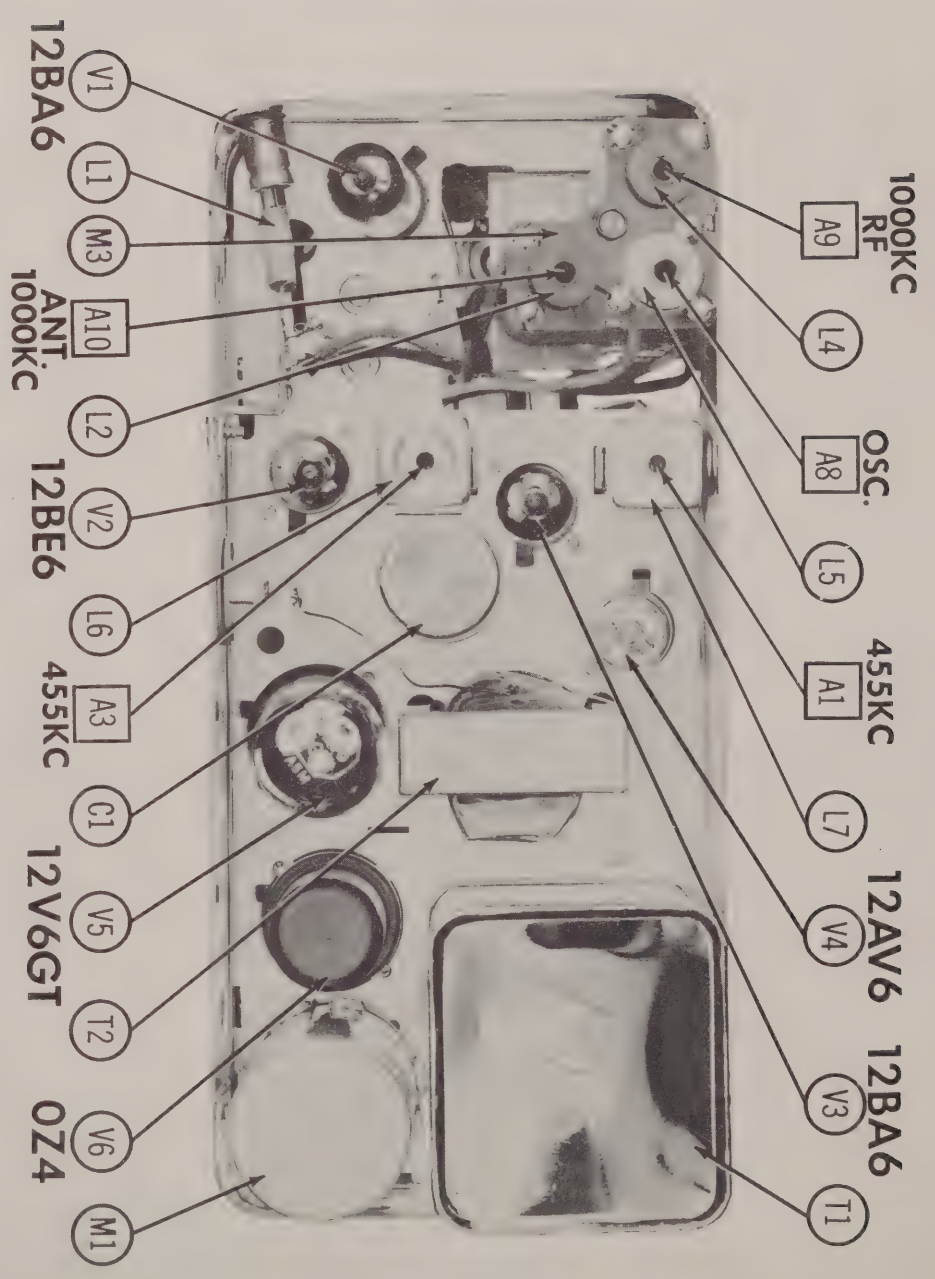
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CHEVROLET PART No.	IRC PART No.	
R2	2.2Meg	½	1239	BTS-2.2Meg	
R3	15KΩ	2	1277	BTB-15K	
R4	15KΩ	1	1253	BTA-15K	
R5	100Ω	½	1113	BTS-100	
R6	330KΩ	½	1229	BTS-330K	
R7	22KΩ	½	1215	BTS-22K	
R8	150Ω	½	1115	BTS-150	
R9	1Meg	½	1235c.	BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CHEVROLET PART No.	IRC PART No.	
R10	47KΩ	½	1219	BTS-47K	
R11	6.8Meg	½	1245	BTS-6.8Meg	
R12	220KΩ	½	1227	BTS-220K	
R13	220KΩ	½	1227	BTS-220K	
R14	330Ω	2		BTB-330	
R15	1800Ω	2			Note 1
R16	15KΩ	1	1253	BTA-15K	
R17	820Ω	1	1161	BTA-820	

Note 1. Mfgr states when replacing this resistor to use a 2700Ω, 2 watt and a 5600Ω, 1 watt resistor in parallel.(Mfgr. part #1204 and 1171.)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	CHEVROLET PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	12VCT @1.8A	600VCT .054A			1220867					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	CHEVROLET PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	4.8KΩ	4.8Ω	6062	Z1002 ①	A-3019 ①	A-3823 ①	26S49 ①	S-5Z ②	① Fabricate mounting. ② Bend mounting feet and solder.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	CHEVROLET PART No.	QUAM PART No.	
SP1	6 x 9"	PM	4.8Ω	6110	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	CHEVROLET PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Loading Coil	.7Ω		7255738	19-1004		4610	7 Microhenries
L2	Ant. Coil	9.5Ω		7258914				
L3	Ant. Coupling Coil	5.5Ω						
L4	RF Coil	9.5Ω		7258914				
L5	Osc. Coil	1.1Ω	4.6Ω	7258911				
L6	Input IF	34Ω	34Ω	1218725	16-6752	BC-350	12-H1	
L7	Output IF	34Ω	34Ω	1218726	16-6754	BC-354	12-H6	
L8	Fil. Choke	0Ω		1217846	19-4215		5221	1.4 Microhenries

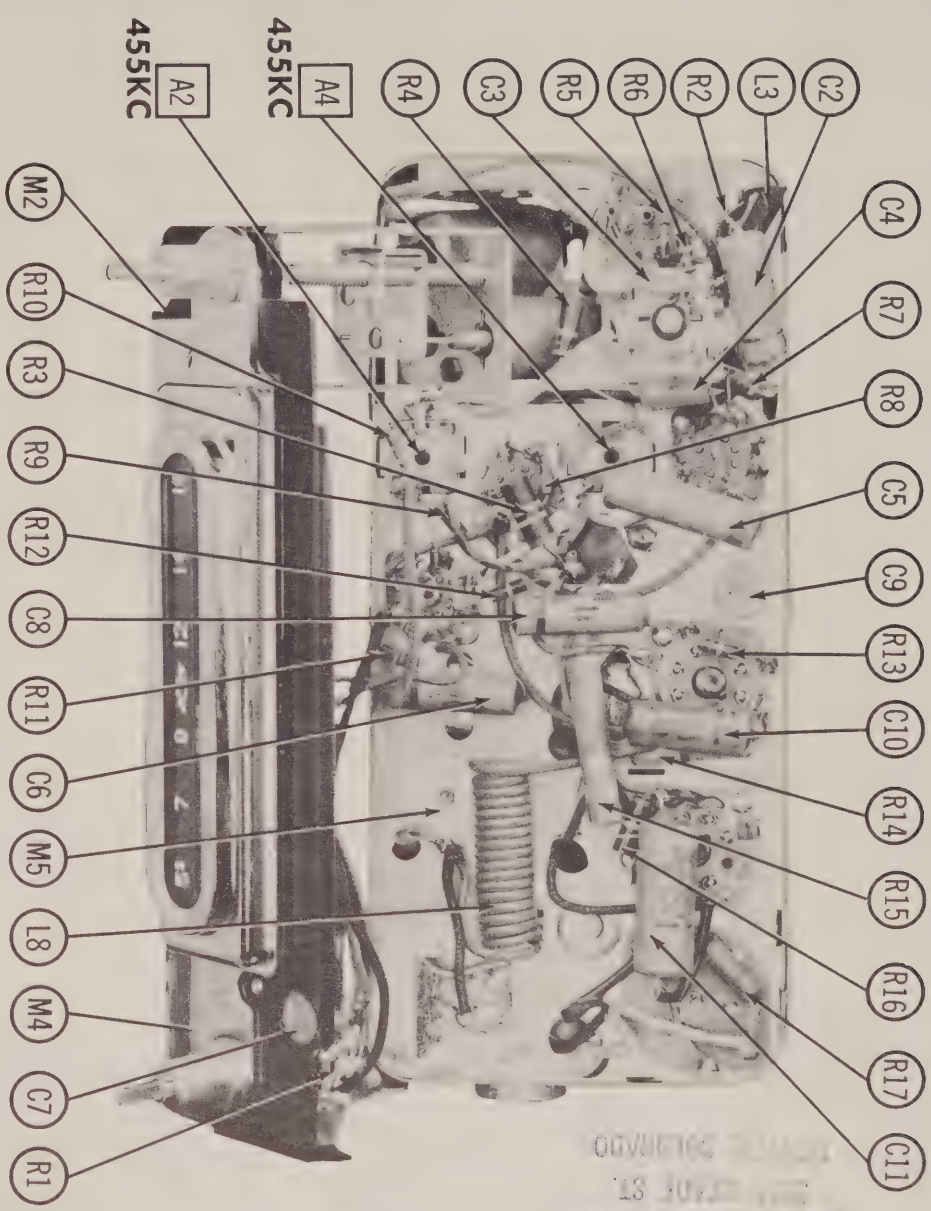
VIBRATOR

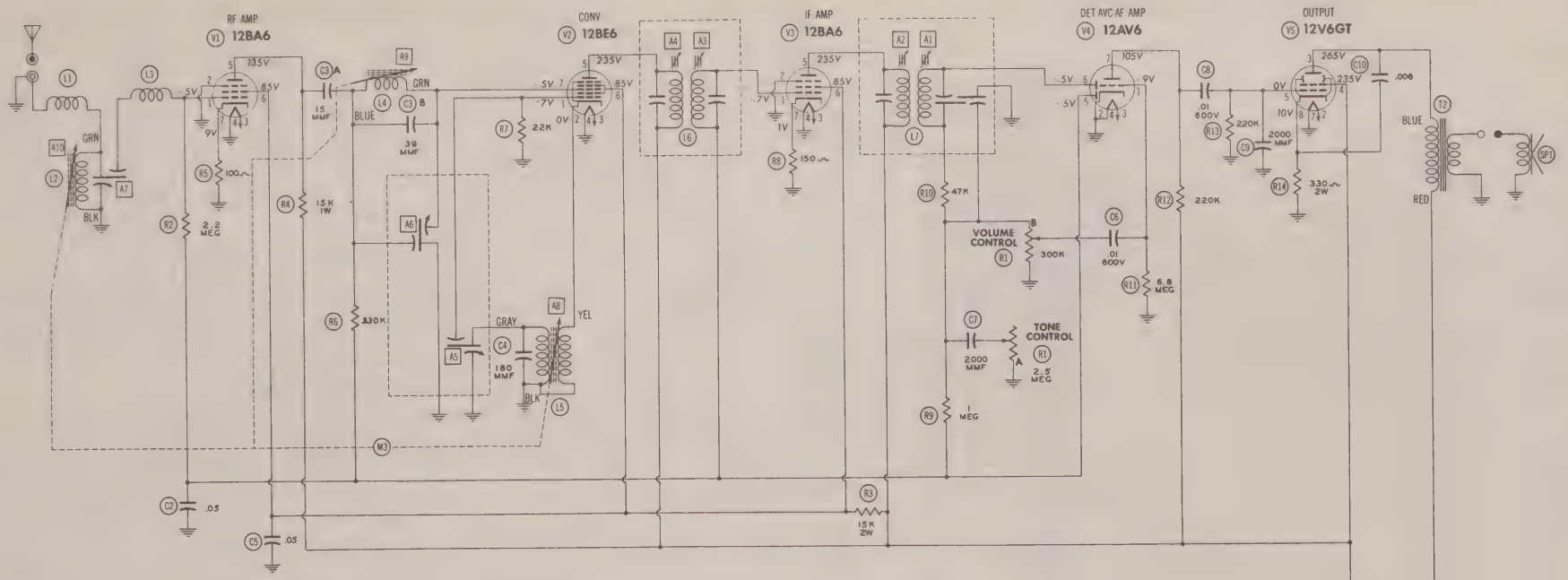
ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				CHEVROLET PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interruptor	12V	115∿	8550	6330	G874/G883	6330	

MISCELLANEOUS

ITEM No.	PART NAME	CHEVROLET PART No.	NOTES
M2	Dial Light		#57
M3	Tuner		Permeability
M4A	Spark Plate	1220308	"A" Lead
B	Spark Plate		Dial Light
M5	Spark Plate	1217848	Filament
A5,A6	Trimmer Cap.	7242454	Dual - Osc. & RF
A7	Trimmer Cap.	7265202	Ant.
	Knob	7265768	On-off-volume & tuning
	Knob	7265770	Dummy
	Knob	7265769	Tone
	Pointer Assy.	7265195	
	Escutcheon Assy.	7266198	Includes dial glass

CHASSIS—BOTTOM VIEW





IF=262KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

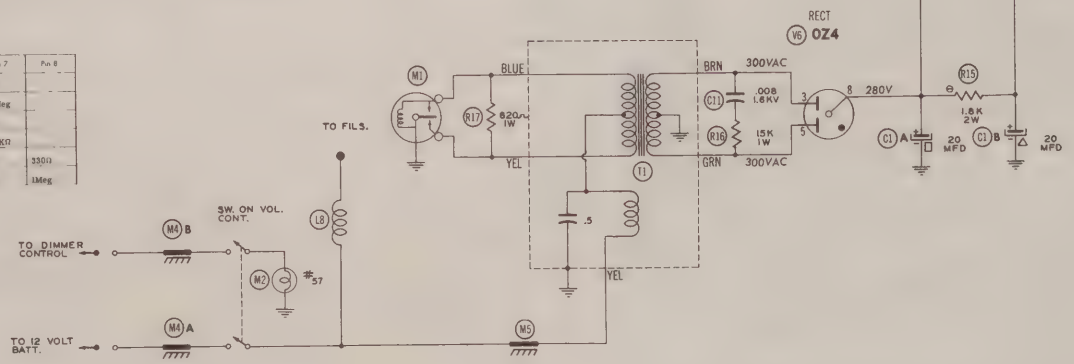
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BA6	3.5Meg	0Ω	3Ω	0Ω	†16.8KΩ	†16.8KΩ	100Ω	
V 2	12BE6	22KΩ	1Ω	3Ω	0Ω	†1.8KΩ	†16.8KΩ	1.6Meg	
V 3	12BA6	1.3Meg	0Ω	3Ω	0Ω	†1.8KΩ	†16.8KΩ	150Ω	
V 4	12AV6	6.8Meg	0Ω	3Ω	0Ω	347KΩ	1.3Meg	†221KΩ	
V 5	12V6GT	NC	3Ω	†400Ω	†1.8KΩ	220KΩ	NC	0Ω	330Ω
V 6	0Z4	TP	NC	220Ω	NC	220Ω	NC	TP	1Meg

† MEASURED FROM PIN 8 OF V6.
NC - NO CONNECTION.
TP - TIE POINT.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 2 IN SET 291

Admiral chassis 20XP5, 20XP5A, 20X5A, 20X5CZ and 20X5EZ were covered in Photofact Folder 2 — Set 291.

Chassis 20AX5, 20AX5A, 20AX5B, 20AX5D, 20AX5EZ, 20AX5F, 20AX5GZ, 20X5, 20X5B and 20X5GZ are added with the publication of this bulletin.

A complete chart giving all new models, chassis and picture tube used in each is given below.

MODEL	CHASSIS	PICTURE TUBE
CA2256	20AX5A	21XP4
CA2306BZ	20AX5EZ	21AUP4A
CA2306Z	20AX5EZ	21AUP4A
CA2307BZ	20AX5EZ	21AUP4A
CA2307Z	20AX5EZ	21AUP4A
K2256	20X5B	21XP4
K2257	20X5B	21XP4
K2366Z	20X5GZ	21AUP4A
K2367Z	20X5GZ	21AUP4A
KA2256	20AX5B	21XP4
KA2257	20AX5B	21XP4
KA2366Z	20AX5GZ	21AUP4A
KA2367Z	20AX5GZ	21AUP4A
T1831	20X5	17HP4
T1832	20X5	17HP4
T1842	20X5	17HP4
TA1812B	20AX5F	17HP4
TA1831	20AX5	17HP4
TA1832	20AX5	17HP4
TA1842	20AX5	17HP4

CHASSIS IDENTIFICATION

Following is a brief comparison of chassis, later in this bulletin a detailed list of all changes will be given.

Ch. 20X5 — Chassis 20X5 is very similar to chassis 20XP5, except it uses a cascode type of tuner.

Ch. 20X5B — Chassis 20X5B is very similar to chassis 20X5A, except it has a built-in AM radio and does not use a printed circuit assembly.

Ch. 20X5GZ — Chassis 20X5GZ is very similar to chassis 20X5B, except that it uses a 21AUP4A picture tube.

Ch. 20AX5 — Chassis 20AX5 is very similar to chassis 20X5, except it is a UHF-VHF chassis employing a 41MC IF strip.

CHASSIS 20AX5, 20AX5A, 20AX5B, 20AX5D, 20AX5EZ, 20AX5F, 20AX5GZ, 20X5, 20X 5B, 20X5GZ

PRODUCTION CHANGES
BULLETIN 142

PRODUCTION CHANGES
BULLETIN 142

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Ch. 20AX5A, D	Chassis 20AX5A, D are very similar to chassis 20AX5, except a 21XP4 picture tube is used.
Ch. 20AX5EZ	Chassis 20AX5EZ is very similar to chassis 20AX5, except it uses a 21AUP4A picture tube.
Ch. 20AX5F	Chassis 20AX5F is very similar to chassis 20AX5, except for location of controls on the front panel of the cabinet.
Ch. 20AX5B	Chassis 20AX5B is very similar to chassis 20AX5, except it has a built-in AM radio.
Ch. 20AX5GZ	Chassis 20AX5GZ is very similar to chassis 20AX5, except it uses a 21AUP4A picture tube.
Ch. 20X5	Chassis 20X5 is electrically identical to chassis 20XP5, except for the following changes: A 56KΩ, ½ watt resistor is added from the junction of C7 and R8 to ground. A 3.3Meg resistor is added from the grid of the sync separator (pin 2 of V12) to ground. R90 is increased from 15KΩ to 18KΩ. The AF amplifier and audio output stage are electrically identical to the alternate circuit for chassis 20XP5 and 20XP5A shown on pages 12 and 21 of PFF 291-2. The video IF strip is electrically identical to the alternate circuit for chassis 20X5A, 20X5CZ and 20X5EZ shown on pages 12 and 21 of PFF 291-2.
Ch. 20X5B	Chassis 20X5B is electrically identical to chassis 20X5A except for the following changes. The video IF strip is electrically identical to the alternate circuit for chassis 20X5A, 20X5CZ and 20X5EZ shown on pages 12 and 21 of PFF 291-2. Chassis 20X5B contains a built-in AM radio (Model No. 2B1A). The audio output is also changed. A schematic of the radio and the audio output stage is given in Fig. 1. Alignment procedure for the radio is given later in this bulletin. NEW CONTROLS Tone control added. Part #75C13-46. Volume control and switch changed to part #75C2-16. Contrast control changed to part # 75B13-21 in Run 9 and lower. Contrast control changed to part #75B13-55 in Run 10 and higher. Vertical and horizontal hold controls are combined into a dual concentric, new part #75B17-5. RADIO DIAL CORD The correct dial cord stringing for the radio is shown in Fig. 5.
Ch. 20X5GZ	Chassis 20X5GZ is electrically identical to chassis 20X5B, except a 21AUP4A picture tube is used.
Ch. 20X5, B, GZ	The following production run changes were made in later production. Production run changes 4, 5 and 8 apply to chassis 20X5, 20X5B and 20X5GZ. These changes are given on page 20 of PFF 291-2. Production run changes 6, 7, 9, 10 and 11 are given below and apply to the chassis so designated.
Ch. 20X5GZ (Run 6)	TO INCREASE WIDTH C68 is added across the horizontal coils of the deflection yoke (T5) in chassis 20X5GZ only.
Ch. 20X5GZ (Run 7)	COMPONENT CHANGE R93 is decreased from 4.7Ω to 3.3Ω. R90 is decreased from 18KΩ to 15KΩ. R94, 180KΩ is added in series with the second anode lead. C68 is omitted.
Ch. 20X5B, 20X5GZ (Run 9)	TO PREVENT AUDIO FROM MODULATING VIDEO AT HIGH VOLUME R41 is removed from pin 6 of V11 (6AS5) and connected to the 260V line.
Ch. 20X5B, 20X5GZ (Run 10)	COMPONENT CHANGE R41 is increased from 1 watt to 2 watts.

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Ch. 20X5GZ (Run 11)	VIDEO OUTPUT CIRCUIT CHANGE The video output circuit has been modified in Run 11. A partial schematic showing the new circuit arrangement is given in Fig. 2. A .1MFD capacitor is added from the junction of R90 and C66 to ground.
Ch. 20AX5, A, D, EZ, F	UHF-VHF SETS Chassis 20AX5, 20AX5A, 20AX5B, 20AX5D, 20AX5EZ, 20AX5F and 20AX5GZ are all UHF-VHF sets employing a 41MC IF strip. UHF tuner (part #94D66-1 and VHF tuner (part #94D64-2) and the new 41MC IF strip are shown in Fig. 3. Following is a complete comparison of chassis along with the production run changes. Complete alignment procedure for tuners 94D66-1, 94D64-2 and the 41MC IF strip are given in this bulletin. Chassis 20AX5, 20AX5A, 20AX5D, 20AX5EZ and 20AX5F are electrically identical to chassis 20X5, except they are UHF-VHF sets utilizing a 41MC IF strip. This new arrangement is shown in Fig. 3.
Ch. 20AX5B, 20AX5GZ	Chassis 20AX5B and 20AX5GZ are electrically identical to chassis 20AX5, except for the following changes. A built-in AM radio (Model 2B1A) is included in chassis 20AX5B and 20AX5GZ. A schematic of the radio and the audio output stage is shown in Fig. 1. AGC network is revised. A partial schematic is given in Fig. 4 showing the new circuit.
Ch. 20AX5, A, B, D, EZ, F, GZ (Run 4)	TO PREVENT CAPACITOR C4 BREAKDOWN R91 is increased from 1.2KΩ, 1 watt to 3.3KΩ, 2 watts to reduce the voltage applied to C4.
Ch. 20AX5, A, B, D, EZ, F, GZ (Run 5)	TO DECREASE WIDTH C68 is omitted to decrease the load across the horizontal coils of the deflection yoke.
Ch. 20AX5EZ, 20AX5GZ (Run 6)	TO INCREASE WIDTH C68 is added across the horizontal coils of the deflection yoke.
Ch. 20AX5EZ, 20AX5GZ (Run 7)	TO INCREASE WIDTH AND DECREASE HIGH VOLTAGE. C68 is omitted. R90 is decreased from 18KΩ to 15KΩ. R93 is decreased from 4.7Ω to 3.3Ω. R94 is added in series with the 2nd. anode lead.
Ch. 20AX5, A, B, D, EZ, F, GZ (Run 8)	TO IMPROVE SYNC STABILITY R61 is increased from 27KΩ to 39KΩ. R62 is increased from 2.7Meg to 3.3Meg.
Ch. 20AX5GZ (Run 9)	COMPONENT CHANGE R41 is removed from pin 6 of V11 (6AS5) and connected to the 260V line.
Ch. 20AX5GZ (Run 10)	TO PREVENT OVERHEATING R41 is increased from 1 watt to 2 watts.
Ch. 20AX5A, 20AX5EZ (Run 11)	TO IMPROVE NOISE IMMUNITY The AGC circuit has been revised. A partial schematic showing the new circuit is given in Fig. 2.
Ch. 20AX5, A, D, EZ, F (Runs 11 & 12)	CIRCUIT CHANGE The AGC line has been revised and is now as shown for chassis 20XP5. The video output circuit is changed and the new circuit is shown in Fig. 2.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Allow proper time for receiver and test equipment to warm-up.

VIDEO IF ALIGNMENT FOR VHF-UHF MODELS

Set the contrast control for minimum contrast. Connect the negative lead of a 3 volt battery to point Ⓑ. Connect the positive lead to chassis. Use only enough generator output to provide a usable indication on VTVM (2 volts maximum). Preset adjustments A2 and A3 out of coil form (fully counter clockwise).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (6U8). Low side to chassis.	47.25MC	12	DC probe thru decoupling filter (Fig. 1) to point Ⓐ. Common to chassis.	A1	Adjust for MINIMUM deflection. If necessary reduce bias to obtain usable reading on VTVM.
2.	"	"	45.3MC	"	"	A2	Adjust bias back to -3 volts if reduced for adjustment of A1. Adjust A2 for maximum deflection.
3.	"	"	43.3MC	"	"	A3	Adjust A3 for maximum deflection. Repeat step 2.
4.	"	"	45.3MC	"	"	A3, A4	Adjust for maximum deflection.
5.	"	"	43.3MC	"	"	A5	"
6.	"	"	43.95MC	"	"	A6	"

OVERALL VIDEO IF ALIGNMENT FOR VHF-UHF MODELS

Leave bias connected as under "Video IF Alignment For VHF-UHF Models". Use only enough sweep generator output to provide usable indication on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to an ungrounded shield floating over converter tube (6U8). Low side to chassis.	44MC (10MC Swp)	41.25MC 42.0MC 42.75MC 45.75MC 47.25MC	12	Vert. Amp. thru decoupling filter (Fig. 1) to point Ⓐ. Low side to chassis.		Check for response similar to Fig. 2. If necessary, retouch A2 thru A6 for desired response. Increase generator output and observe position of 47.25MC trap marker. If necessary slightly retouch A1 to place 47.25MC marker in trap notch.

IF TRAP ADJUSTMENT

The IF trap adjustment (A7) is for the purpose of eliminating any IF interference from nearby transmitters operating in the 40MC band. If IF interference is noted, turn to channel 2 and adjust A7 to minimize interference.

OSCILLATOR ALIGNMENT FOR VHF TUNER 94D64-2

Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A8. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A8 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached thru a hole just above and slightly to the left of the channel switch shaft (hole extends thru UHF tuner). The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru decoupling filter (Fig. 1) to point Ⓐ.	A9	Adjust to place sound marker in trap notch as shown in Fig. 3. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A10	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A11	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A12	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A13	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A14	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A15	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A16	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A17	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A18	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A19	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A20	

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VHF OSCILLATOR ALIGNMENT USING ON THE AIR SIGNAL

Set the fine tuning control to the mid-position of its range.
The channel oscillator adjustment screws are reached thru a hole just above and to the left of the channel switch shaft (hole extends thru UHF tuner). The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Tune in all available stations in that area and adjust the proper oscillator slug for best sound and picture.

VHF RF AND MIXER ALIGNMENT

Connect bias as under "Video IF Alignment". If unable to obtain an response curve of usable amplitude, disconnect the bias supply and connect a clip lead from tuner AGC line to chassis.
If sweep generator has no built-in marker loosely couple a separate marker generator to antenna terminals. Use only enough sweep and marker generator output for usable indication on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. to point (C). Low side to chassis.	A21, A22	Adjust for response curve similar to Fig. 4 with markers above 90%.
10.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A23	Adjust for response curve similar to Fig. 4 with markers above 90%. Repeat step 9.
11.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response curve similar to Fig. 4 on all high band channels. If markers fall below 70% on any channel, make slight compromise adjustment of A21 and A22 with channel switch set to that channel. Switch set to that channel. Recheck all other high band channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
12.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for response curve similar to Fig. 4 on all low band channels. If markers fall below 70% on any channel, make compromise adjustment of A23 with channel switch set to that channel. Recheck all other low band channels to see that they have not been seriously affected.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

OVERALL VHF TUNER AND IF RESPONSE CURVE CHECK

Set the contrast control for minimum contrast. Connect the negative lead of a 3 volt bias supply to point (B). Connect the positive lead to chassis.
If sweep generator has no built-in marker, loosely couple a separate marker generator to the high side of sweep generator output. Use only enough sweep and marker generator output of usable indication on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru decoupling filter (Fig. 1) to point (A). Low side to chassis.		Check for response curve similar to Fig. 5. If necessary, slightly retouch A2 and A3 for desired response.
14.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check all channels for response curve similar to Fig. 5. If necessary, make compromise adjustment of A2 and A3 for response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

ALIGNMENT OF UHF IF PRE-AMPLIFIER FOR VHF-UHF TUNERS

The IF preamplifier has been properly aligned at the factory and is very stable. Unless poor reception is obtained on UHF channels, alignment should not be required in the field.
Remove the mixer crystal from its hold (located on top of UHF tuner 94D66-1).
If sweep generator has no built-in marker, loosely couple a separate marker generator to high side of sweep generator output. Use only enough sweep and marker generator output for usable indication on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	100Ω Carbon Resistor	High side thru a 100Ω resistor to the negative terminal of crystal holder (front terminal). Low side to chassis.	44.0MC (10MC Swp)	41.25MC 45.75MC	Between channels 5 and 6.	Vert. Amp. to point Ⓒ. Low side to chassis.	A24, A25, A26	Detune adjustments A2 and A3 by turning three turns counter clockwise. Adjust A24, A25 and A26 for response curve similar to Fig. 6. Adjust A24 for maximum amplitude at center portion of response curve. Adjust A25 and A26 for correct marker position, bandwidth and equal peaks as in Fig. 6. Turn adjustments A2 and A3 back clockwise three turns.

UHF TUNER ALIGNMENT

Connect the negative lead of a 1.5 volt bias battery to point Ⓑ.
Connect the positive lead to chassis.
If UHF sweep generator has no built-in marker, loosely couple a separate UHF marker generator to antenna terminals.
Switch VHF-UHF combination tuner to UHF position.
The top cover of UHF tuner must be kept in place during alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 130Ω Carbon Resistors	Across UHF antenna terminals with 130Ω in each lead.	503MC (10MC Swp)	503.5MC	19	Vert. Amp. to point Ⓒ Low side to chassis. (Use scope preamp. if necessary).	A27	Adjust A27 to place marker in center of the response curve.
17.	"	"	869MC (10MC Swp)	869.5MC	80	"	A28	Adjust A28 to place marker in center of the response curve.
18.	"	"	887MC (10MC Swp)	885.25MC 889.75MC	83	"		Adjust the two preselector trimmer tabs by bending up or down for maximum response as in Fig. 4. Adjustment of these two tabs are made from the bottom of UHF tuner. Use an insulated tool with a hook on end.

19. Tune over the entire UHF range (14 thru 83) and check tracking. If necessary adjust the preselector rotor blades (adjacent to the stator) by knifing to obtain response curve similar to Fig. 4 on each channel. The markers may ride down the curve as far as 70% without seriously affecting the alignment. Always knife the rotor blades while tuning in the lower frequency to avoid affecting the tracking above the point of knifing. A check of which section to knife may be made by touching the plates with the knifing tool while observing the response curve on scope. Knife the rotor blades from the bottom of tuner. Repeat steps 16, 17 and 18 after knifing rotor blades.

RADIO ALIGNMENT

Turn function switch to radio position.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
20.	.1MFD	High side to stator plates of antenna section of tuning gang. Low side to chassis.	455KC	Tuning gang fully open	Across voice coil	A29, A30, A31, A32	Adjust for maximum deflection.
21.	"	"	1620KC	"	"	A33	"
22.	"	Loop	1400KC	"	"	A34	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

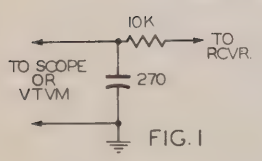

FIG. 1

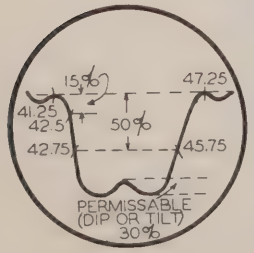

FIG. 2

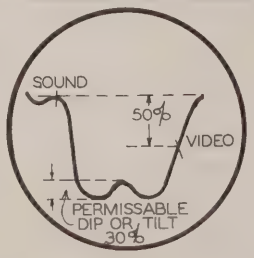

FIG. 3

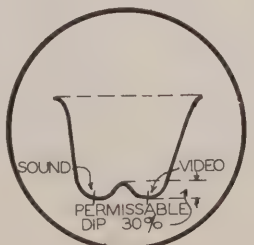

FIG. 4

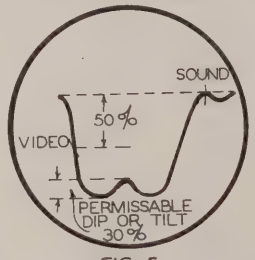

FIG. 5

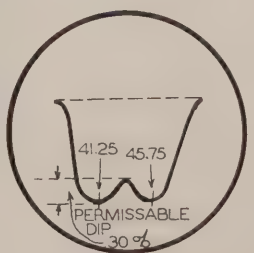

FIG. 6

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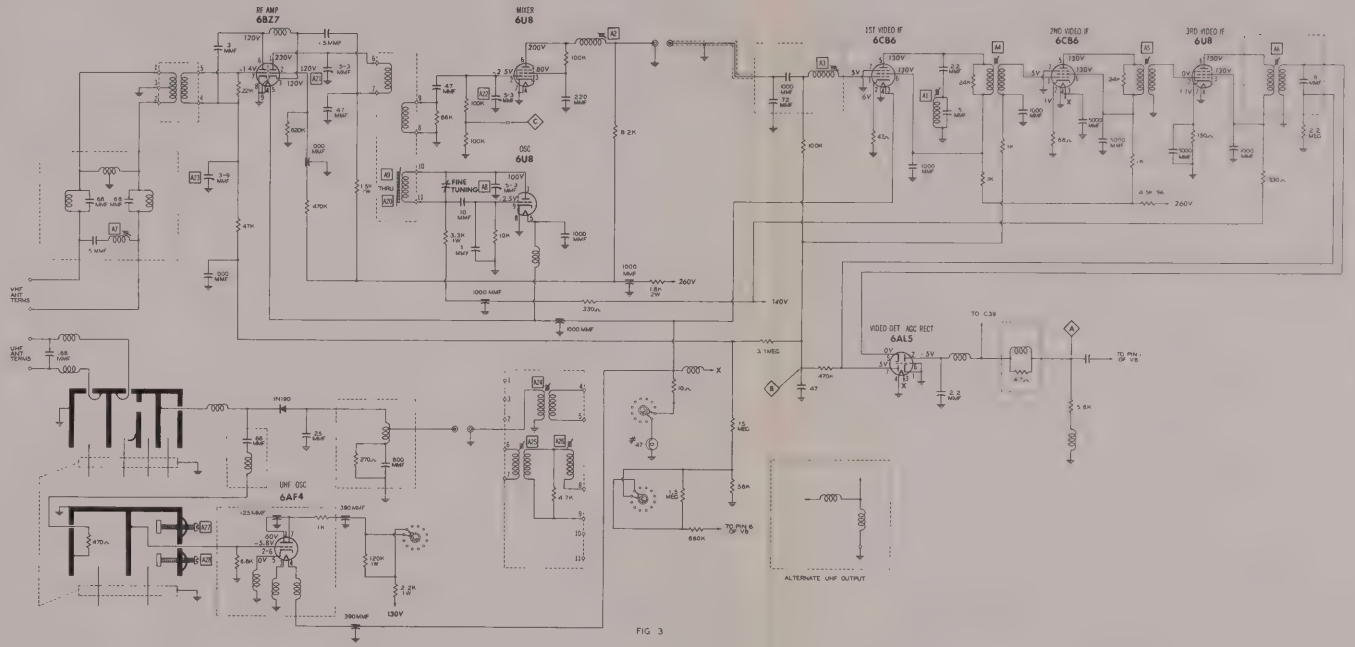


FIG 3

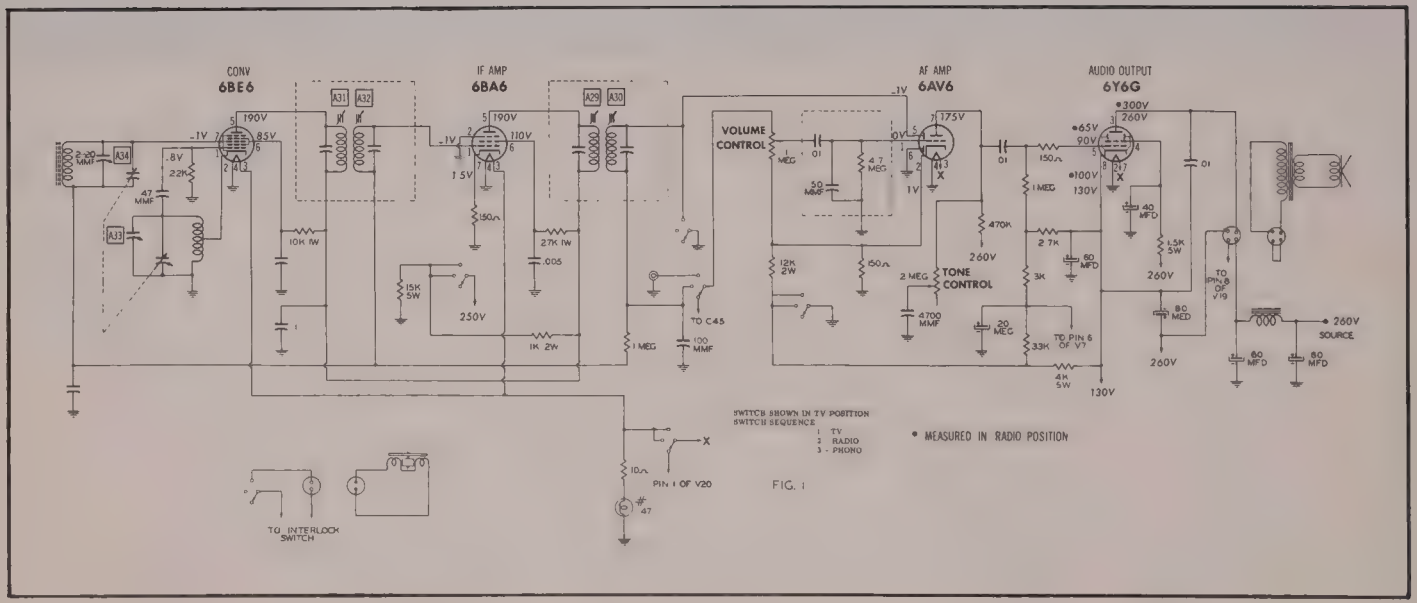

CONV
6BE6
IF AMP
6BA6
AF AMP
6AV6
AUDIO OUTPUT
6Y6G
VOLUME CONTROL
TONE CONTROL
TO C45
250V
260V
130V
SOURCE
TO INTERLOCK SWITCH
TO PIN 1 OF V20
TO PIN 6 OF V7
TO PIN 6 OF V19
SWITCH SHOWN IN TV POSITION
SWITCH SEQUENCE
1 - TV
2 - RADIO
3 - PHONO
• MEASURED IN RADIO POSITION

FIG. 1

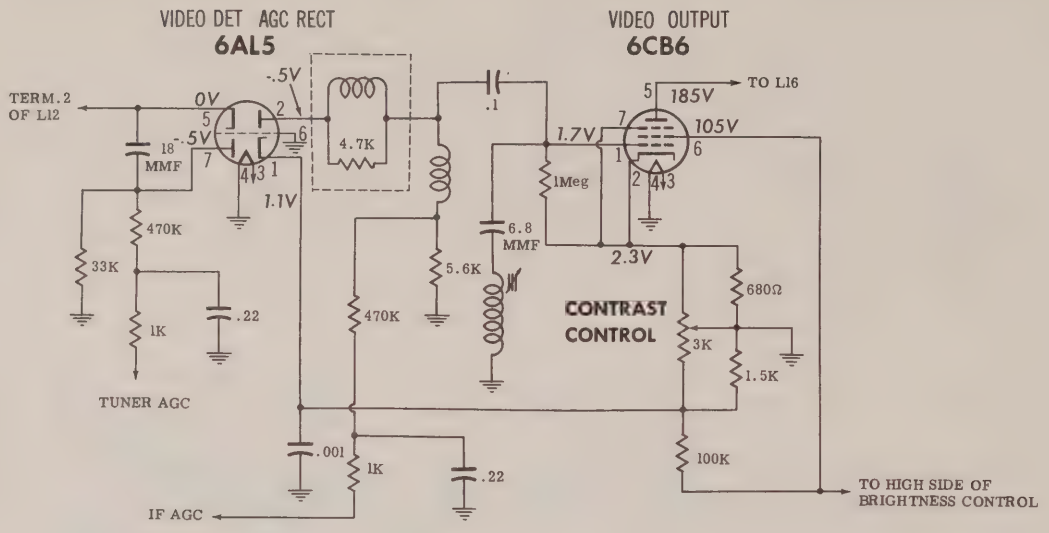


FIG. 2

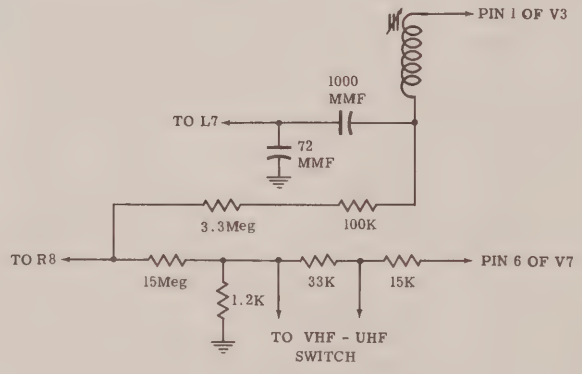
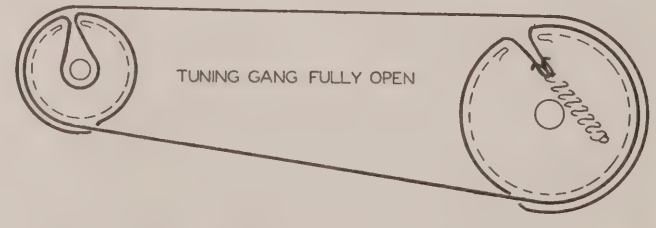


FIG. 4



RADIO DRIVE CORD STRINGING

FIG. 5

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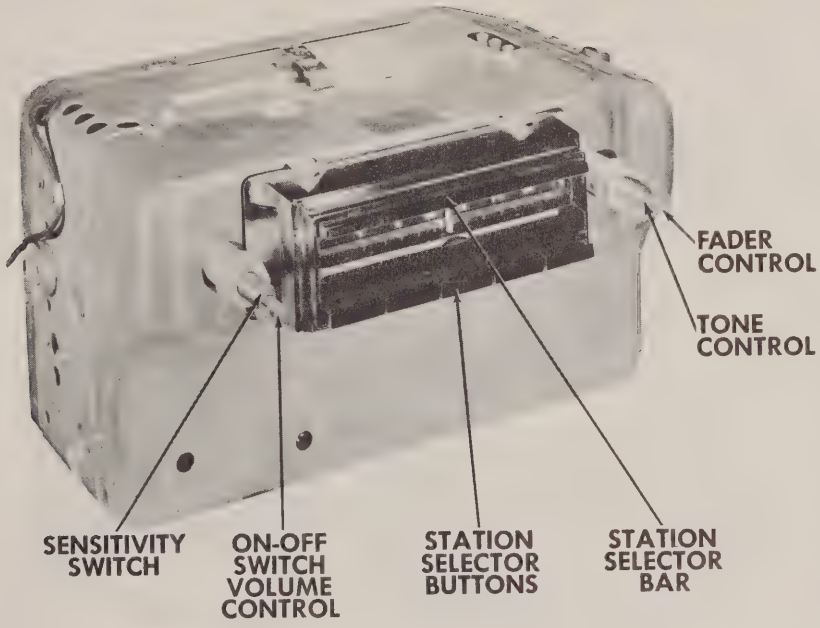
CADILLAC MODELS
7265825, 7265845



CADILLAC MODELS
7265825, 7265845

TRADE NAME	Cadillac Models 7265825 (1955 Cadillac Sedans), 7265845 (1955 Cadillac Convertibles)
MANUFACTURER	Cadillac Motor Car Co., Div. of General Motors, Detroit, Michigan
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Eight)	Types: 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12BF6 Det. -AVC-AF Amp., (2) 6V6GT Output, 12AU7 Trigger, 0Z4 Rectifier
POWER SUPPLY	12 Volt Storage Battery — RATING 3.4 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	• 540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	262KC (400~ Mod.)	High frequency end stop. *	DC probe to point (A). Low side to chassis.	A1, A2 A3	Adjust for maximum output.
2.	"	"	"	"	"	A4	Adjust for MINIMUM output.
3.	68MMF	High side to antenna receptacle. Low side to chassis.	1615	"		A5, A6, A7 §	Adjust for maximum output.
4.	"	"	600KC	Tune to 600KC signal.	"	A9, A10	"
5.	"	"	1615	Tune to 1615KC signal	"	A6, A7	"
6.	"	"	1000KC	Tune to 1000KC signal	"		Set pointer adjustment, if necessary, so that pointer coincides with 1000KC on dial.
7.						A7	With receiver installed in car, and antenna fully extended, tune to weak station between 600 and 1000KC. Adjust A7 for maximum volume.

* Place .070 feeler gauge (or stripped #13 wire) in slot against high freq. end stop. Depress selector bar and allow planetary arm to run up against feeler gauge. Turn receiver off and then on.

§ Check A8 (osc. coil) before adjusting A5, 6, 7. Rear of osc. core should be 1 25/32" from mounting end of coil form.

PUSH BUTTON SETUP

Open door below dial to expose selector tabs. Tune to signal desired nearest left end of dial. Move selector tab nearest left end of dial to coincide with pointer. Repeat on remaining selector tabs progressing toward right end of dial.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CADILLAC PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Det.-AVC-AF Amp.	12BF6	12BF6	7BT	
V5	Audio Output	12V6GT	12V6GT	7AC	
V6	Audio Output	12V6GT	12V6GT	7AC	
V7	Trigger	12AU7	12AU7	9A	
V8	Rect.	0Z4	0Z4	4R	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CADILLAC PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■20	400	M-908	FP345.8	TM-3046	T-550	
B	▲20	400					
C	20	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

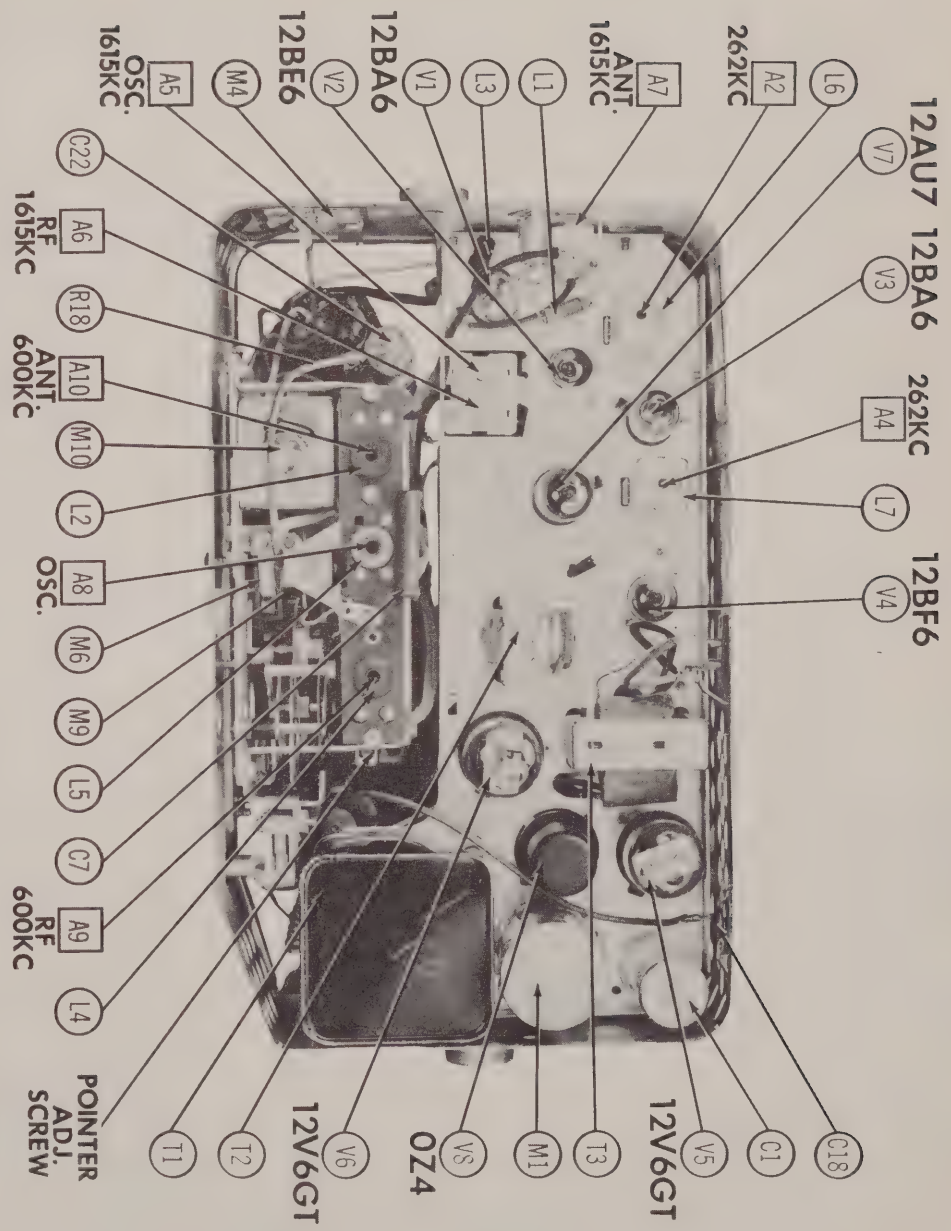
ITEM No,	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CADILLAC PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.05	600	6512	DF-503		PT615	
C3	.05	200	6512	DF-503		PT415	
C4	.1	400	6513	DF-104		PT401	
C5	68	500	G-680	TCZ-68	NPO-337-680		
C6	39		6366				
C7	260		7257567				
C8	.1	200	6590	DF-104		PT401	
C9	100	500	1219498	TCZ-100	NPO-337-101	MCE235	
C10	100	500	1219498	TCZ-100	NPO-337-101	MCE235	
C11	.005	600	6531	D6-502	GP2-333-502	PT625	
C12	100	500	G-101	TCZ-100	NPO-337-101	MCB235	
C13	.002	600	6528	D6-202	GP2-333-202	PT622	
C14	220	500	G-221	TCZ-220	NPO-335-221		
C15	.2	400	6514			PT412	
C16	.025	400	1211232			PT4125	
C17	.0015	800	7236134	DD-152	811-152	MCK-215	
C18	150		6373	DD-151	811-151	ZT-5315	
C19	.002	600	6528	D6-202	GP2-333-202	PT622	
C20	.007	1600	H-702	DD16-702		PT1627	
C21	.47	100	6592			RF-480	
C22	.5	200	6592			PT405	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CADILLAC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	Switch		7264638					Sensitivity (Panel)
B	1.5Meg	½						Volume & Switch, Tap 300KΩ (Rear)
R2A	Switch		7264639					Tone (Panel) See Note 1.
B	35Ω	2						Fader, Wire Wound (Rear)

Note 1. Control No. 7264611 used as an alternate in some versions of model 726825, Control No. 7264683 used in model 7265845.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA CADILLAC PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R3	2.2Meg	½	1239	BTS-2.2Meg	
R4	15KΩ	1	1253	BTA-15K	
R5	100Ω	½	1115	BTS-100	
R6	1.5Meg	½	1237	BTS-1.5Meg	
R7	330KΩ	½	1229	BTS-330K	
R8	22KΩ	½	1215	BTS-22K	
R9	12KΩ	2	1276	BTB-12K	
R10	10Ω	½	1101	BTS-10	
R11	150Ω	½	1115	BTS-150	
R12	1Meg	½	1235	BTS-1Meg	
R13	47KΩ	1	1259	BTA-47K	
R14	100Ω 5%	½	1320176	BTS-100Ω 5%	
R15	3300Ω 5%	½		BTS-3300 5%	Note 1
R16	47KΩ	½	1219	BTS-47K	
R17	820KΩ	½	1234	BTS-820K	
R18	100KΩ	½	1223	BTS-100K	
R19	3900Ω	½	1152	BTS-3900	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA CADILLAC PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R20	12KΩ	½	1213	BTS-12K	
R21	360Ω 5%	1	7345483	BW-1-360 5%	
R22	120KΩ	½	1234	BTS-120K	
R23	12KΩ	1	1253	BTA-12K	
R24	47KΩ	1	1259	BTA-47K	
R25	47KΩ 5%	1	1320188	BTA-47K 5%	
R26	820KΩ 5%	½		BTS-820K 5%	Note 2
R27	1.5Meg 5%	½	1219492	BTS-1.5Meg 5%	
R28	5.6Meg	½	1244	BTS-5.6Meg	
R29	6800Ω 5%	1	1173	BTA-6800 5%	
R30	910Ω 5%	½		BTS-910 5%	Note 3
R31	230Ω	½	1117	BTS-230	
R32	560Ω	½	1122	BTS-560	
R33	2300Ω	½	1129	BTS-2300	
R34	15KΩ	1	1253	BTA-15K	
R35	1800Ω	2			Note 4

Note 1. Some versions use a 2700Ω ½W 5% resistor in this application. (Mfgr. Part #1219756).
Note 2. Some versions use a 1Meg ½W 5% resistor in this application. (Mfgr. Part #1220169).
Note 3. Some versions use a 1000Ω ½W 5% resistor in this application. (Mfgr. Part #720427I).
Note 4. Mfgr. states to replace with a 2700Ω 2W resistor. (Mfgr. Part #1204) and a 5600Ω 1W resistor (Mfgr. Part #1171) in parallel.

TRANSFORMER (VIBRATOR)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA CADILLAC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T1	12.6VCT @2A	590VCT .058ADC			6066	V3904 ①	P4051 ①			

① Drill new mounting holes.

TRANSFORMER (DRIVER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA CADILLAC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T2	1.6KΩCT RES				6061				30A29 ①	

① Connect primary and secondary for 2000Ω CT, fabricate new mounting.

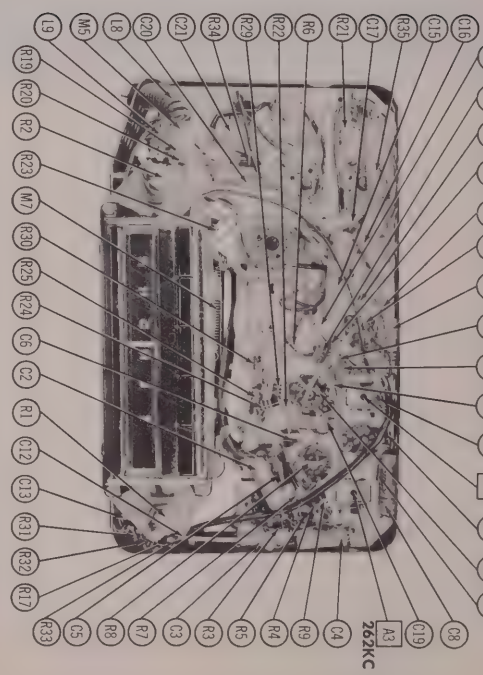
TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA CADILLAC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No	NOTES
T3	7.9KΩ CT	4.4Ω	6063	Z1007	A-3936	A-3952	22S87	S-15X	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	REPLACEMENT DATA CADILLAC PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	6" x 9"	PM	4.4Ω	7265905 7262245 ①	69A3	① Rear seat speaker used with Model 7265825 only.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CADILLAC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coupling Coil	.8Ω		7255738	19-1004		4610	7 Microhenries
L2	Ant. Coil	10Ω		7257979				Core Part No. 1220355
L3	RF Coupling Coil	5Ω		7240251	19-6033		4626	28 Microhenries
L4	RF Coil	10Ω		7257979				Core Part No. 1220355
L5	Osc. Coil	1Ω	4.3Ω	7263287				Core Part No. 1220355
L6	Input IF	42Ω	42Ω	1219508	16-6752	BC-350	12-H1	
L7	Output IF	33Ω	33Ω	1220204	16-6754	BC-354	12-H6	
L8	Rear Spkr. Hash Choke	0Ω		1217846	19-4215	BC-537	5221	1.4 Microhenries
L9	Fil. Choke	0Ω		1217846	19-4215	BC-537	5221	1.4 Microhenries

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA: CADILLAC PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	NOTES
M1	Interruptor	12.6V	115%	8550	6330	G874/G883	6330	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: CADILLAC PART No. FUSE	CADILLAC PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	7AG	7½A	455640		30307.5 (7AG 7½A)		AGW 7½	

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	CADILLAC PART No.	NOTES
M3	Dial Light		#53
M4	Spark Plate	1219768	"A" Lead
M5	Spark Plate	1217848	Filament
M6	Switch	7263340	Tuner Return
M7	Switch	7263912	Station Selector
M8	Switch	7260629	Foot Station Selector
M9	Relay	1220326	
M10	Solenoid	1220685	
A5,A6	Trimmer Cap.	7242454	Dual-Osc. & RF
A7	Trimmer Cap.	7264626	Antenna
	Knob	1459925	On-Off-Volume & Fader
	Knob	1459673	Sensitivity
	Knob	1459674	Tone
	Board	7263916	Tab Rail
	Contact	1220193	Push Button Slide (Set Off)
	Contact	1220191	Selector Tab
	Indicator	1220192	Selector Tab (Set Off)
	Push Button	1220330	No. 1 (Lowest Frequency Setting)
	Push Button	1220331	No. 2
	Push Button	1220332	No. 3
	Push Button	1220333	No. 4
	Push Button	1220334	No. 5 (Highest Frequency Setting)
	Dial Glass	7263586	
	Dial	7264637	Calibrated

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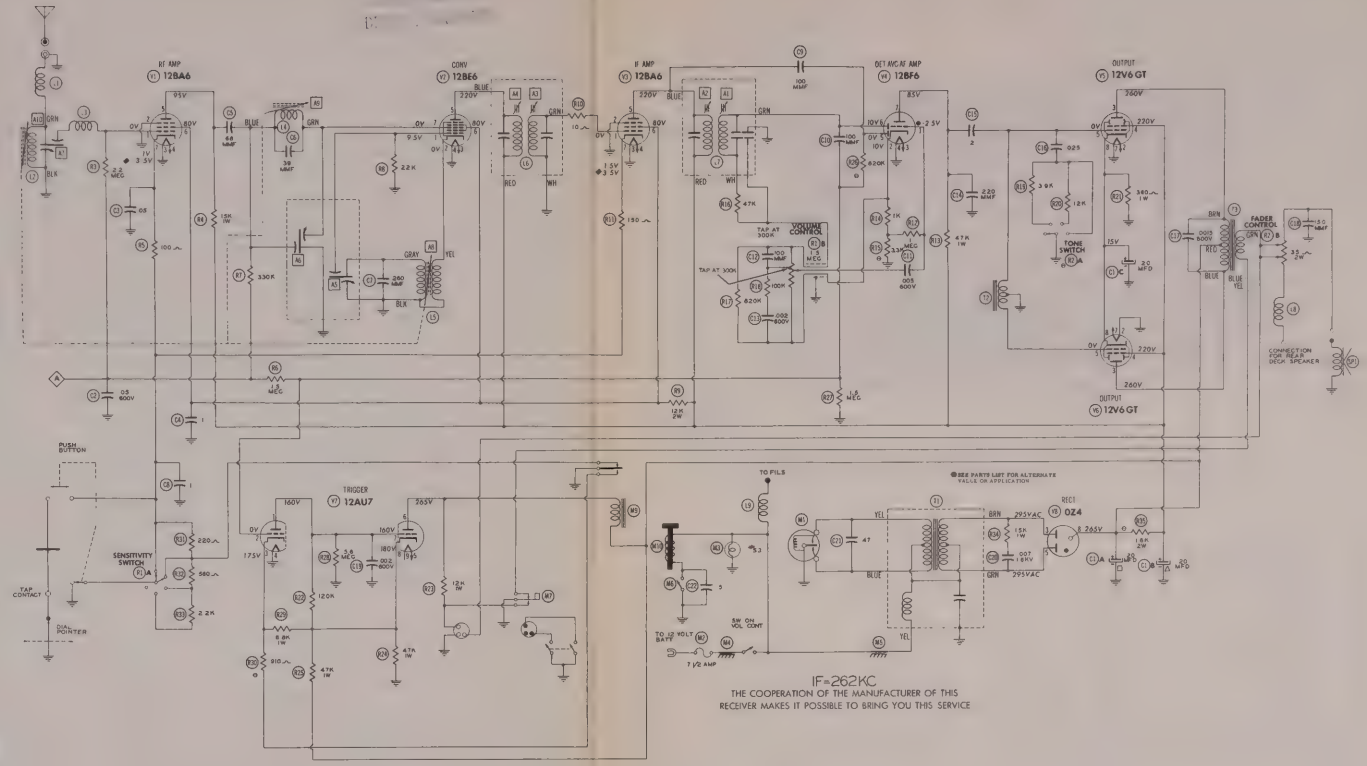

IF=262KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 15.6 volts for voltage readings.
5. Antenna normally connected to receiver for values possible.
6. Variation in line voltage and resistance readings
7. Values controlled: stabilized, no signal applied for voltage measurements

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
* 1	12BA6	5.25Meg	0Ω	0Ω	1.5Ω	1.5Ω	12 KΩ	12 KΩ	3.25Meg	
* 2	12BE6	325Ω	0Ω	1.5Ω	0Ω	1Ω KΩ	13 KΩ	13 KΩ	3.25Meg	
* 3	12BA6	5.5Ω	0Ω	0Ω	1.5Ω	1Ω KΩ	13 KΩ	13 KΩ	0Ω (1 ohm)	
* 4	12BF6	1Meg	6.2KΩ	1.5Ω	0Ω	2.5Meg	150 KΩ	48 KΩ		
* 5	12V6GT	NC	1Ω	2000Ω	1Ω KΩ	1KΩ	NC	1Ω	280Ω	
* 6	12V6GT	NC	0Ω	2000Ω	1Ω KΩ	1KΩ	TP	1 KΩ	280Ω	
* 7	12AU7	1.5MΩ	1.5Meg	150 KΩ	0Ω	1Ω	1Ω KΩ	150 KΩ	150KΩ	0Ω
* 8	0Z4	2Ω	NC	230Ω	NC	230Ω	NC	NC	100KΩ	

ALL MEASUREMENTS WITH SENSITIVITY SWITCH IN MAXIMUM SENSITIVITY POSITION UNLESS DESIGNATED OTHERWISE. INPUT VOLTAGE SET AT 1.8 R.M.S. D.C.
*MEASURED FROM PIN 8 OF V1
●SENSITIVITY SWITCH AT MINIMUM SENSITIVITY POSITION.
● MEASURED FROM PIN 3 OF V4

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DUMONT
CHASSIS RA-312, RA-313

DUMONT MODEL NEW YORKER (Ch. RA-312)

TRADE NAME	Dumont	MODELS	CHASSIS
		Barton, Baylor, Belvidere, Bradley, Clifford, Dellwood, Hamilton, New Yorker, Richfield and Winsted	RA-312 (VHF), RA-313 (UHF-VHF)
MANUFACTURER	Allen B. Dumont Laboratories, Inc., 257 Sixteenth Ave., Paterson, N.J.		
TYPE SET	Television Receiver		
TUBES	Twenty-one		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.82 Amp. @ 117 Volts AC-60 Cycles	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

INDEX

Alignment Instructions 6
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 16
Parts List and Descriptions ..... 11 thru 14
Photographs
Cabinet-Rear View 16
Capacitor Identification 3, 10
Chassis-Top View 7
RF Tuner 14
Resistor Identification 4, 9
Photographs (Cont)
Trans., Inductor & Alignment Identification 7
Resistance Measurements 8
Servicing in the Field 1
Schematic (Alternate Tuner) 15, 16
Schematic (TV) 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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L. F. BLAIR TWNSHIP
3324 MEADE ST.
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 5 push-on type control knobs from front panel of cabinet.

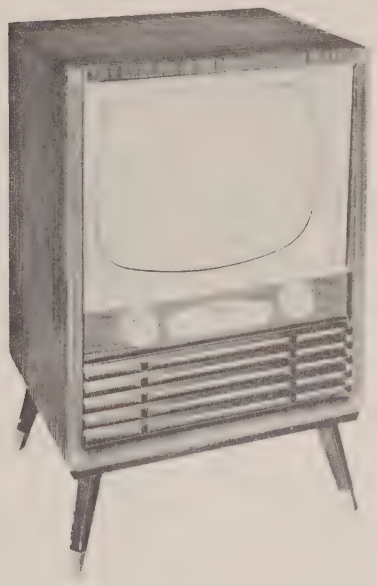
2. Remove 5 wood screws. Remove rear cover.

3. Remove 2 wood screws holding antenna terminal bracket.

4. Disconnect picture tube socket, HV lead, speaker leads, yoke plug and ground strap.

5. Remove 4 chassis bolts. Remove chassis.

6. Remove 4 speaker nuts. Remove 2 speakers.



Barton, Baylor, Belvidere,
Bradley, Clifford, Dellwood,
Hamilton, New Yorker,
Richfield and Winsted ..... CH. RA-312 (VHF)
RA-313 (UHF-VHF)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 5 wood screws holding plastic molding located at the top edge of safety glass. Remove molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

SPECIAL ADJUSTMENTS

A. Noise Control Adjustment

Adjust the noise control (R4) for picture with stable sync. If adjusted too far clockwise picture will have unstable sync.

B. Dumonitor Control Adjustment

The dumonitor (AGC) control is properly adjusted at the factory and will normally not require readjustment. To adjust the AGC control to prevent overloading on very strong signals the following procedure should be used.

1. Set the horizontal hold control for maximum straightness of vertical elements of test pattern or picture near the top of picture.

2. Adjust AGC control until overloading is eliminated.

3. Switch momentarily to another channel and back again.

4. If overloading reappears in step 3, readjust AGC control.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control to its mid-range position and adjust the horizontal stabilizer slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary slug (A11) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DUMONT
CHASSIS RA-312, RA-313

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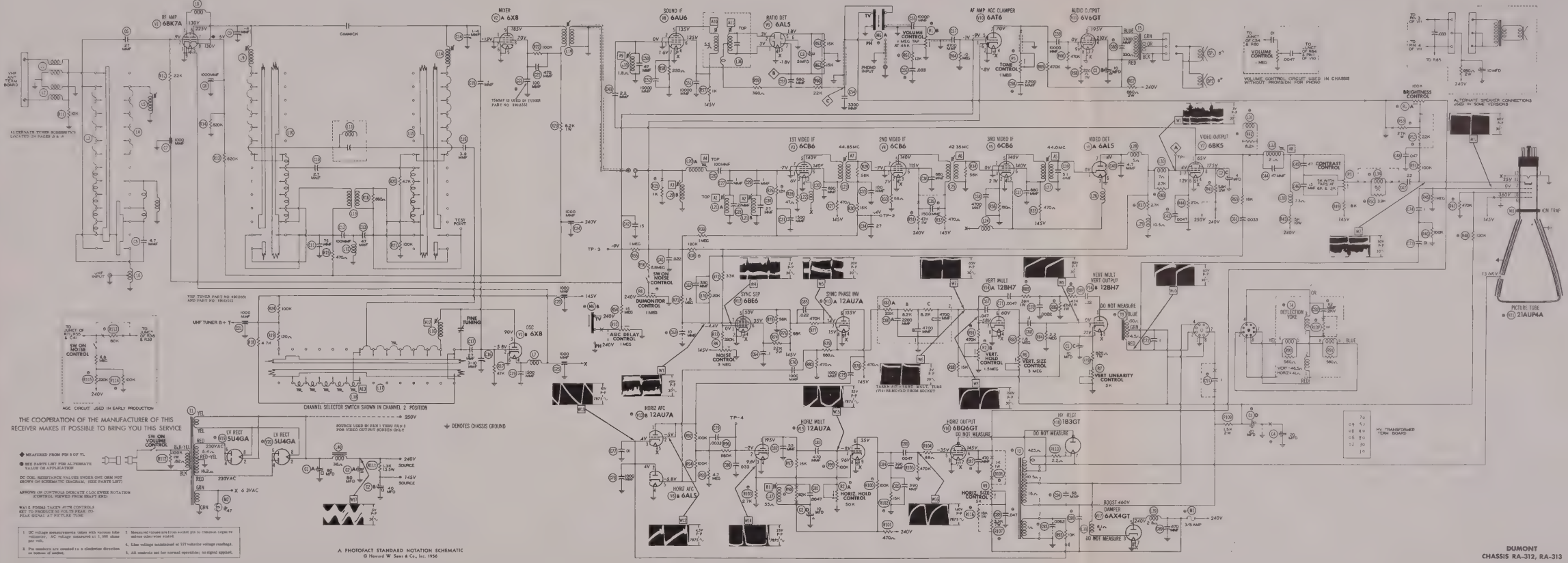
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DUMONT
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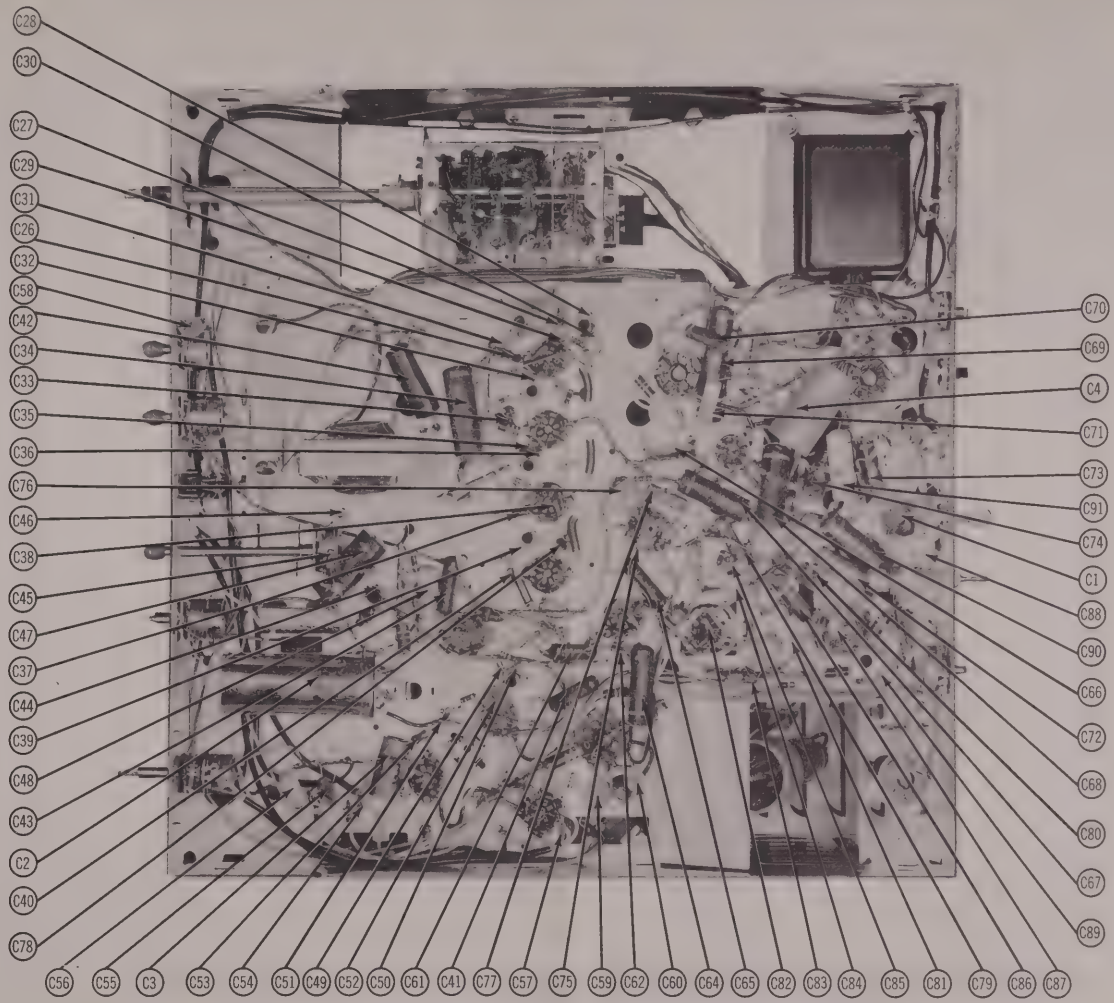

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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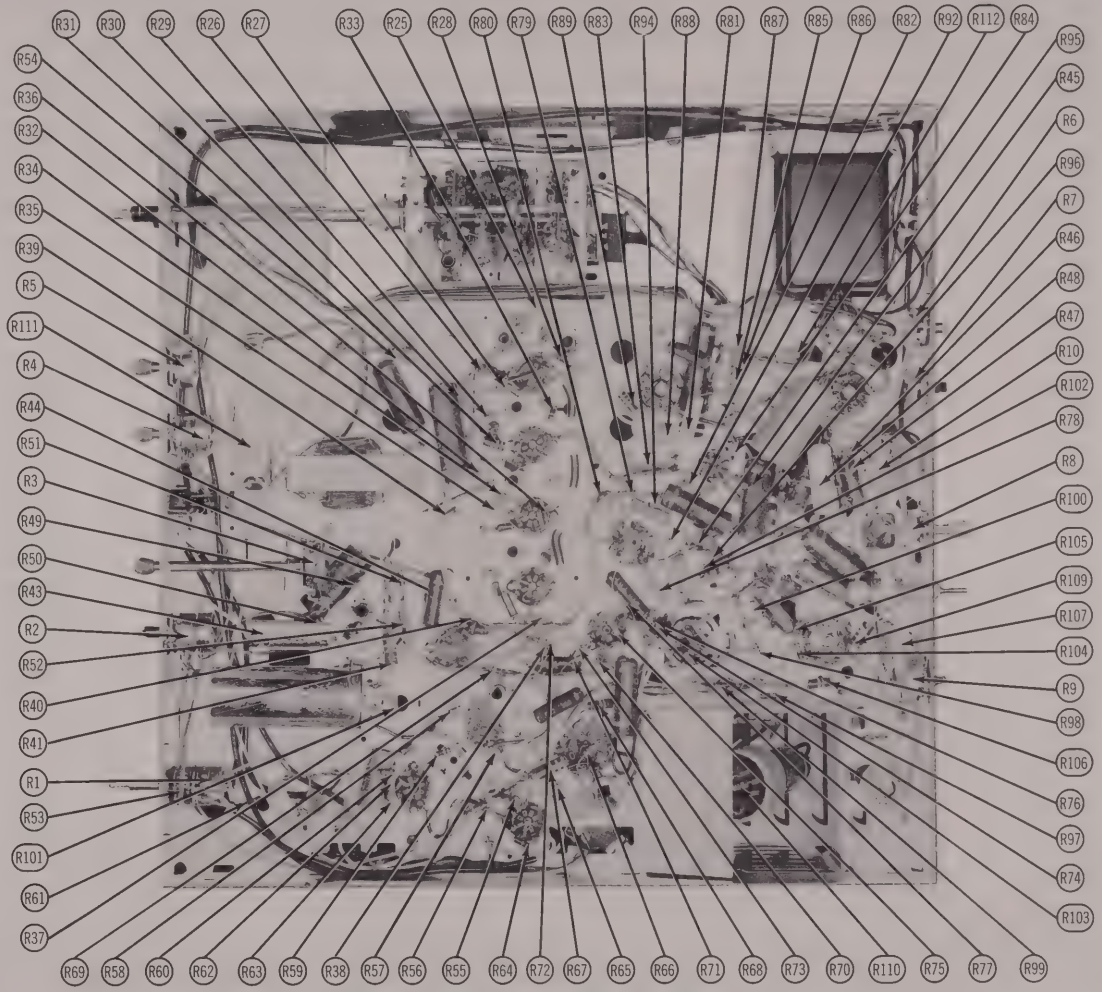
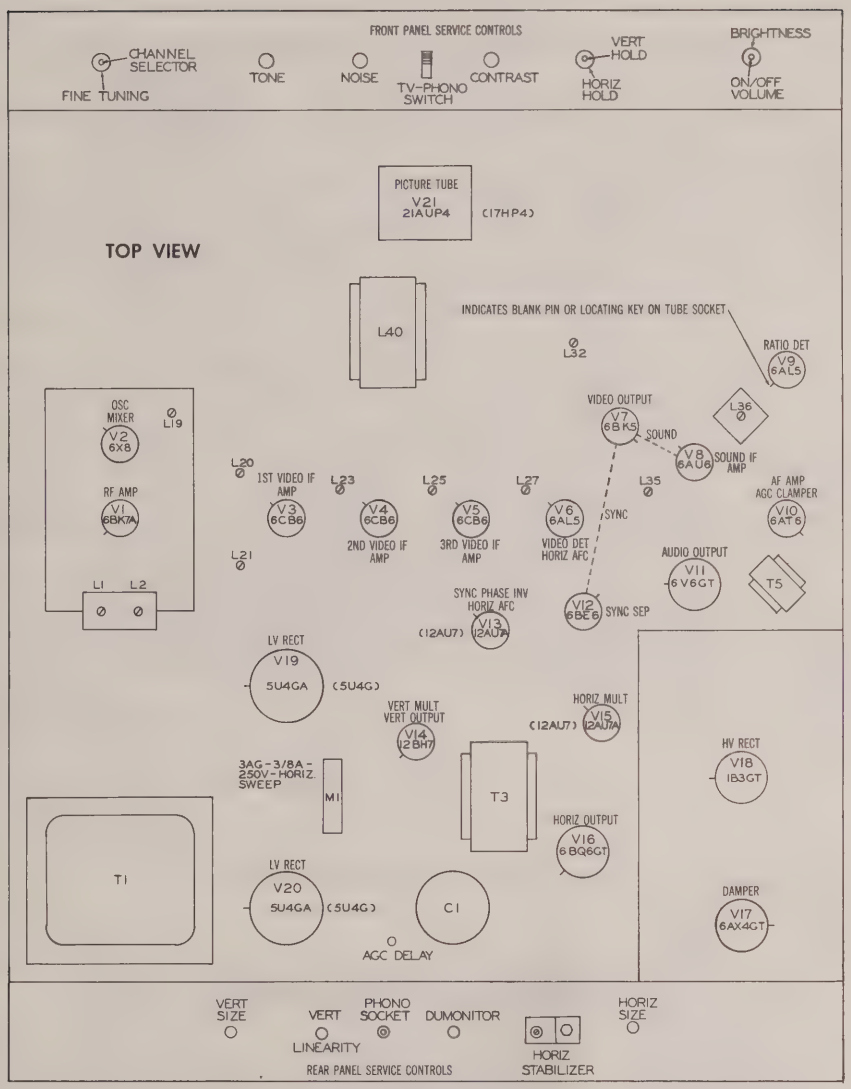


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V19, V20**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V7**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V21**
Has pic, no sound - **V8, V9, V10, V11**
Overloaded picture - **V10**

SYNC FAILURE
No vert. sync - **V13, V14**
No horiz. sync - **V13, V15**
No vert. or horiz. sync - **V12, V13**

SWEEP FAILURE
No raster, has sound - **V15, V16, V17, V18, V21, Fuse (M1)**
No vertical deflection - **V14,**
Poor vert. linearity or foldover - **V14**
Poor horiz. linearity or foldover - **V15, V16, V17**
Narrow picture - **V15, V16, V17, V18, V19, V20**
Vert. off freq. - **V13, V14**
Horiz. off freq. - **V13, V15**

L. F. D.
392[illegible] MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing fuse (M1) from its holder.

VIDEO IF ALIGNMENT

Place the channel selector switch between any two channels. This will disable the local oscillator and reduce the possibility of erroneous indications. Wrap one end of a short length of wire around grid of converter tube V2. Connect the high side of generator to the free end.
Attenuate signal generator output to maintain not more than 2 volts on VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to loose end of wire from grid of converter tube. Low side to chassis.	43.5MC (10MC Swp.)	41.25MC 42.25MC 45.75MC 47.25MC	Between any two channels	Vert. amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V3). Low side to chassis.	A1, A2, A3, A4	Adjust for response curve similar to Fig. 2. Adjust A1 to place 41.25MC marker in trap notch. Adjust A2 to place 47.25MC in trap notch. A3 to place 42.25MC marker on low frequency side of curve. A4 to place 45.75MC at 70% on high frequency side of response curve.
2.	"	"	Not used	44.0MC Unmod.	"	Use VTVM DC probe to point Ⓐ. Common to chassis.	A5	Adjust for maximum deflection.
3.	"	"	"	42.35MC	"	"	A6	"
4.	"	"	"	44.85MC	"	"	A7	"

4.5MC TRAP ALIGNMENT

Set contrast control for maximum contrast.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to point Ⓐ. Low side to chassis.	Not used	4.5MC (400~ Mod.)	Any non-interfering channel	Vert. amp. thru detector (Fig. 1) to pin 11 (cathode) of picture tube. Low side to chassis.	A8	Adjust for MINIMUM 400~ indication on scope.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to point Ⓐ. Low side to chassis.	4.5MC (450KC Swp.)	4.5MC	Any	Vert. Amp. to point Ⓑ. Low side to chassis.	A9, A10	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude symmetry similar to Fig. 3.
7.	"	"	"	"	"	Vert. amp. to point Ⓒ. Low side to chassis.	A11	Reconnect C3. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

Disconnect test equipment and replace fuse (M1) in its holder.
Connect antenna to VHF antenna terminals. Tune in a TV station and adjust for best picture.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	Not used	Not used. Tune in a TV signal.	Not used	Strongest TV station signal available.	DC probe to point Ⓑ. Common to chassis.	A9, A10	Adjust for maximum deflection.
7.	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

VHF OSCILLATOR ALIGNMENT FOR TUNERS 89013551/89013552

Set the fine tuning control to the center of its range. Set the channel selector to the highest band channel (7-13) station operating in the area. Adjust the high band oscillator adjustment (A12) for best picture detail. Check all other high-band channels. If an individual oscillator adjustment is not available for each channel, adjust the next highest channel oscillator slug.
Set the channel selector switch to highest low-band channel (2-6) operating in the area. Adjust A13 for best picture detail. Check all other low-band channels. If an individual oscillator adjustment is not available for each low-band channel, adjust the next highest low-band channel oscillator slug. Recheck all other channels as adjustments are made and if any change repeat entire procedure.

VHF OSCILLATOR ALIGNMENT FOR TUNERS 89013461/89013471

Place the flat surface of the fine tuning control shaft downward. The channel oscillator adjustment screws are reached near the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Tune in all available stations in your area and adjust the proper oscillator slug for clearest picture and best sound.

VHF RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

ALIGNMENT FOR UHF PORTION OF TUNERS

In the event the UHF oscillator tube is replaced, it is recommended that several tubes be tried and the one which works best should be used. Alignment of the UHF tuner is not recommended in the field.

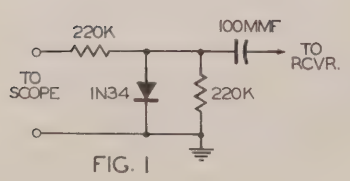


FIG. 1

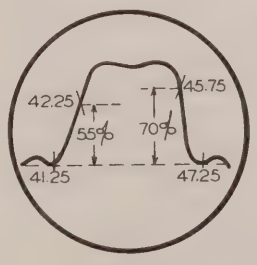


FIG. 2

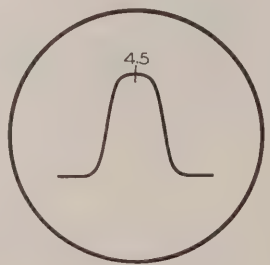


FIG. 3

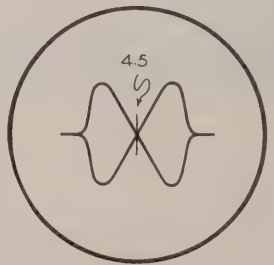


FIG. 4

PROPERTY OF
L. F. BLANKENSHIP
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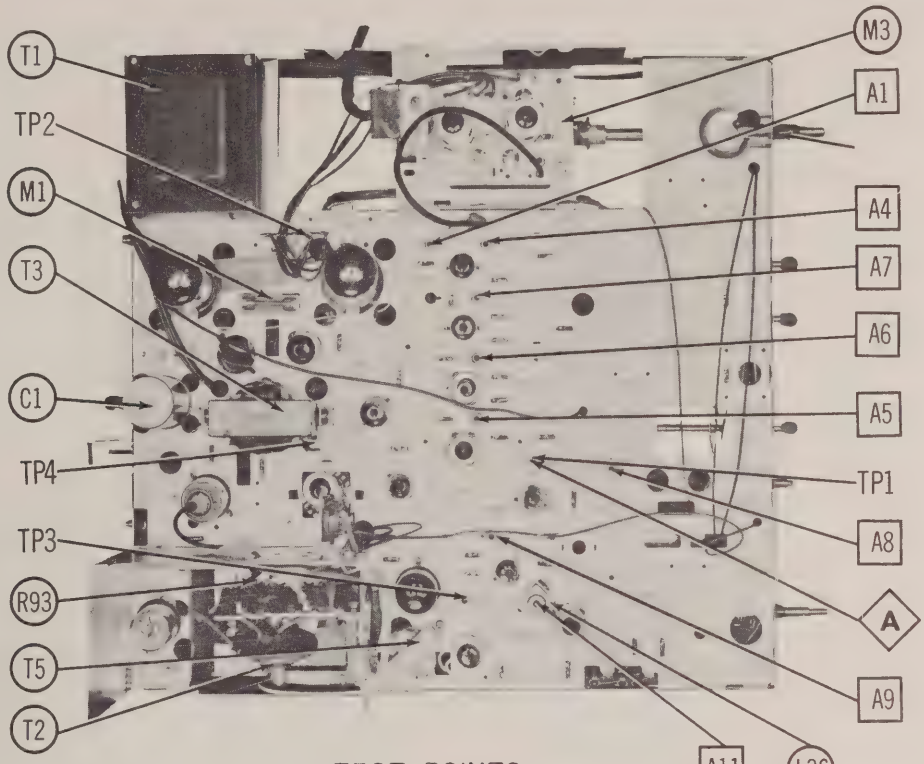
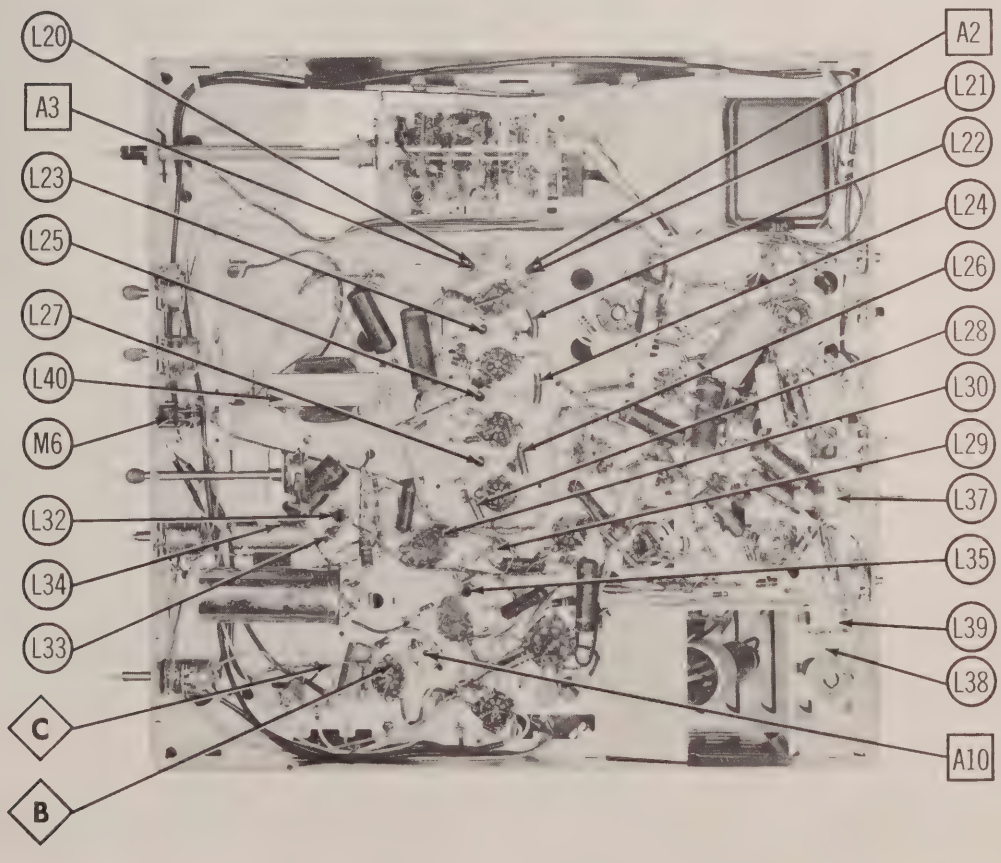
DENVER, COLORADO



TEST POINTS

(1) (-.4V.) VIDEO DET. OUTPUT (A) (3) (-.9V.) RF AGC
(2) (-.4V.) IF AGC (4) (-.2V.) AFC

CHASSIS TOP VIEW

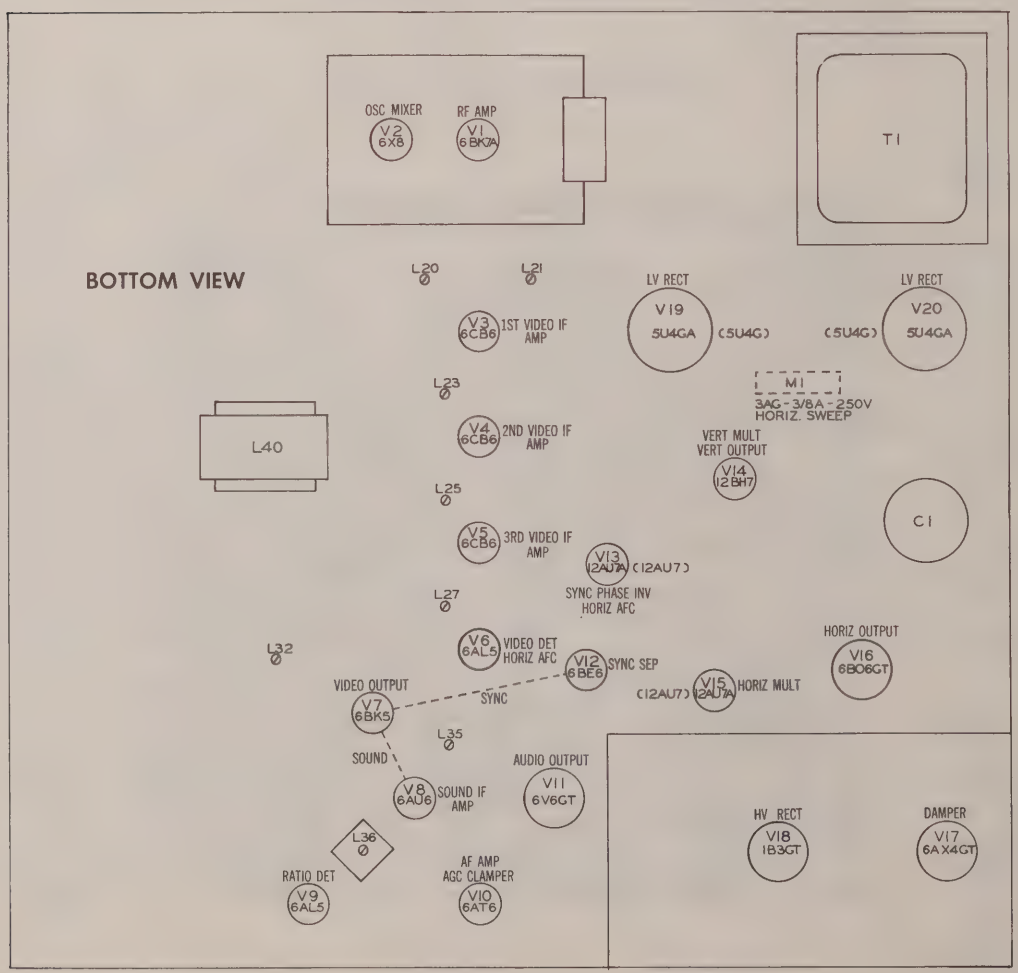


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BK7A	INF	1Meg	0Ω	0Ω	.1Ω	†500Ω	380KΩ	INF	0Ω
V 2	6X8	0Ω	47KΩ	†6KΩ	.1Ω	0Ω	0Ω	100KΩ	†110KΩ	†8.2KΩ
V 3	6CB6	1Meg	47Ω	.1Ω	0Ω	†1.8KΩ	†1.8KΩ	0Ω		
V 4	6CB6	1Meg	68Ω	.1Ω	0Ω	†1.8KΩ	†48KΩ	0Ω		
V 5	6CB6	.1Ω	180Ω	.1Ω	0Ω	†1.8KΩ	†1.8KΩ	0Ω		
V 6	6AL5	.1Ω	10KΩ	.1Ω	0Ω	4.8Meg	0Ω	2.7KΩ		
V 7	6BK5	†4.2KΩ	NC	2.7KΩ	.1Ω	0Ω	27Ω	2.7KΩ	†5.6KΩ	NC
V 8	6AU6	1.8Ω	0Ω	0Ω	.1Ω	†2.3KΩ	†2.3KΩ	220Ω		
V 9	6AL5	INF	INF	.1Ω	0Ω	15KΩ	0Ω	15KΩ		
V 10	6AT6	10Meg	0Ω	0Ω	.1Ω	1Meg	180KΩ	†470KΩ		
V 11	6V6GT	NC	0Ω	†1.1KΩ	†800Ω	470KΩ	TP	.1Ω	220Ω	
V 12	6BE6	36KΩ	0Ω	0Ω	.1Ω	†50KΩ	†23KΩ	2Meg		
V 13	12AU7A	4.8Meg	4.8Meg	10KΩ	.1Ω	.1Ω	†1.8KΩ	500KΩ	1.1KΩ	0Ω
V 14	12BH7	▲2.2KΩ	2.2Meg	2.2KΩ	.1Ω	.1Ω	▲3.5Meg	1Meg	0Ω	0Ω
V 15	12AU7A	†16KΩ	5Meg	2.7KΩ	0Ω	0Ω	†100KΩ	100KΩ	2.7KΩ	.1Ω
V 16	6BQ6GT	NC	.1Ω	TP	†9KΩ	470KΩ	TP	0Ω	0Ω	TOP CAP ▲17Ω
V 17	6AX4GT	NC	NC	550KΩ	NC	†42Ω	NC	.1Ω	0Ω	
V 18	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲440Ω
V 19	5U4GA	NC	50KΩ	NC	15Ω	TP	15Ω	TP	50KΩ	
V 20	5U4GA	NC	50KΩ	NC	16Ω	NC	16Ω	TP	50KΩ	
V 21	21AUP4	0Ω	1Meg	PIN 6 †1.3KΩ	PIN 10 ▲120KΩ	PIN 11 †170KΩ	PIN 12 .1Ω			

†MEASURED FROM PIN 2 OF V20.
▲MEASURED FROM PIN 3 OF V17.
NC-NO CONNECTION.
TP-TIE POINT.



TUBE PLACEMENT CHART

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		DUMONT PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BK7A	6BK7A	9AJ	
V2	Mixer-Osc.	6X8	6X8	9AX	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Det. - Horiz. AFC	6AL5	6AL5	6BT	
V7	Video Output	6BK5	6BK5	9BQ	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp. - AGC Clamper	6AT6	6AT6	7BT	
V11	Audio Output	6V6GT	6V6GT	7AC	
V12	Sync Sep.	6BE6	6BE6	7CH	
V13	Sync Phase Inv. - Horiz. AFC	12AU7A	12AU7A	9A	12AU7 used as an alternate.
V14	Vert. Mult. - Vert. Output	12BH7	12BH7	9A	
V15	Horiz. Mult.	12AU7A	12AU7A	9A	12AU7 used as an alternate.
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rect.	1B3GT	1B3GT	3C	
V19	LV Rect.	5U4GA	5U4GA	5T	5U4G used as an alternate.
V20	LV Rect.	5U4GA	5U4GA	5T	5U4G used as an alternate.

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	DUMONT PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V21	21AUP4A ①	21AUP4A ① 21AUP4		21AUP4A ② 21AUP4	21AUP4A ① 21AUP4	12L 12L	① Aluminized ② Silver Screen
	17HP4	17HP4/17RP4	17RP4/17HP4	17HP4/ 17RP4	17HP4/17RP4	12L	
		17HP4B ①		17HP4B ②		12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	DUMONT PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■80	350	03151427	FP333.8	TM-4046	Q-025	
B	▲10	350		TC32			
C	10	50					
D	▲20	350					Note 1
C2A	▲80	350	03151425	FP385.5	TM-4111	T-180	
B	■40	350		TC60		FM-4504	
C	4	350					
D	▲10	350					
C3	5	100	03138362	TC40	TD-4-150	FM-1504	
C4	20	350	03138364	TC65	TD-20-350	FM-4520	Note 2

Note 1. Chassis prior to run 4 use 10MFD in this application.
Note 2. Not used prior to run 4.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	DUMONT PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C5	4.7		03133920	TCZ-4R7	NPOA-4R7	ZT-5547	
C6	27		03125470	TCZ-27	NPOL-270		
C7	1000		03146041				
C8	1000		03146041				
C9	1-4		03019872	829-4	3115-01-10	CT551	
C10	2.7		03133890				
C11	75		03154140	TCZ-75	NPO-337-750	ZT-5475	
C12	100		03154170	DD-101	801-101	UC-531	
C13	47		03160350	DD-470	831-470	UC-5447	
C14	1-4		03019872	829-4	3115-01-10	CT551	
C15	1		03133830	TCZ-1	NPOA-010		
C16	3-10		03157763	829-10			
C17	27		03163500	TCZ-27	NPOL-270		
C18	3.9		03133910				
C19	1500		03153710	DD-152	801-0015	DC-5215	
C20	1000		03146041				
C21	1000		03146041				
C22	470		03121560	DD-471	831-471	UC-5347	
C23	100		03154170	DD-101	801-101	UC-531	Note 15
C24	1000		03146041				
C25	1000		03146041				
C26	100		03151900	D6-101	GP1K-101	UC-531	
C27	1		03133830	TCZ-1	NPOA-010		
C28	27		03151520	TCZ-27	NPOL-270		
C29	1		03133830	TCZ-1	NPOA-010		
C30	27		03151520	TCZ-27	NPOL-270		
C31	1500		03153710	DD-152	801-0015	DC-5215	
C32	680		03151960	D6-681	GP2K-681	UC-5368	
C33	100		03151900	D6-101	GP1K-101	UC-531	
C34	.27	200	03140170				
C35	1500		03153710	DD-152	801-0015	DC-5215	Note 14
C36	680		03151960	D6-681	GP2K-681	UC-5368	
C37	680		03151960	D6-681	GP2K-681	UC-5368	
C38	4700		03153740	DD-472	GP2-333-472	DC-525	
C39	5.1		03153180		NPOA-050	ZT-555	
C40	4.7		03146750	TCZ-4R7	NPOA-4R7	ZT-5547	
C41	.022	200	03140320	DF-203	817-02	PT4122	
C42	.15	200	03140370			PT4015	
C43	.0047	600	03141040	D6-472	GP2-333-472	PT6247	Note 3
C44	47		03151550	TCZ-47	NPO-338-470	ZT-5447	
C45	47		03151550	TCZ-47	NPO-338-470	ZT-5447	
C46	15		03133010	D6-150	GP1K-150	UC-5415	

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA DUMONT PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C47	.22	400	03141140			PT4022	
C48	.047	400	03141100	DF-503		PT4047	
C49	2.2		03153460	TCE-3R2	MPOA-3R2		
C50	47		03151150	TCE-47	MPO-33S-470	ET-5447	
C51	10000		03151930	DD-103	811-01	DC-511	
C52	10000		03151930	DD-103	811-01	DC-511	
C53	680		03151690	DD-681	GP2K-681	UC-5368	
C54	3300		03153730	D6-332	811-0033	UC-5333	
C55	10000		03151930	DD-103	811-01	DC-511	
C56	.033	300	03153530	DF-303		PT6133	Note 4
C57	4700		03153740	DD-472	811-0047	DC-525	
C58	3300		03153730	D6-332	811-0033	UC-5333	Note 4
C59	10000		03151930	DD-103	811-01	DC-511	
C60	3300		03153730	D6-332	811-333	UC-5333	Note 5
C61	.0033	400	03140300	D6-332	GP3-332-332	PT6133	
C62	330		03151630	D6-331	GP2K-331	UC-5333	
C63	10		03146790	D6-100	GP1K-100	UC-541	Note 6
C64	.1	400	03141130	DF-104		PT401	
C65	.023	300	03140230	DF-303	811-03	PT4123	
	C65A 2300					DC-523	
	B 4700		+88000681	+PC-100	+1406-01	DC-525	
	C 4700					DC-525	
C67	.047	600	03141500	DF-503		PT4047	
C68	.1	600	03141830	DF-104		PT601	
C69	.023	1600	03139453			PT6123	
C70	.0022	600	03140540	D6-222	GP3-333-222	PT2222	
C71	.0047	400	03140580	D6-472	GP3-333-472	PT6247	
C72	.1	300	03140350	DF-104		PT401	
C73	.01	600	03141760	D6-103	GP3-333-103	PT611	
C74	.1	300	03140350	DF-104		PT401	
C75	1000		03153800	DD-103	811-001	DC-521	
C76	1000		03153800	DD-103	811-001	DC-521	
C77	.01	300	03140200	D6-103	GP3-333-103	PT611	
C78	1000		03153700	DD-102	811-001	DC-521	
C79	.0033	400	03140350	D6-333	GP3-333-333	PT6133	
C80	.033	300	03140330	DF-303		PT6133	
C81	.0047	600	03139683			MCB465	
C82	33		02153030	D6-330	GP1K-330	UC-5433	
C83	470	500	03021130	D6-471	811-471	MCB245	
C84	330	500	03020500	D6-331	811-331	MCB243	
C85	330	500	03020500	D6-331	811-331	MCB243	
C86	.0047	600	03141040	D6-472	GP3-333-472	PT2347	
C87	470		03151940	DD-471	811-471	UC-5347	Note 7
C88	.047	400	03141100	DF-503		PT4147	Note 8
C89	470		03151850	DD-471	811-471	UC-5347	
C90	.1	600	03141540	DF-104		PT601	Note 9
C91	.1	300	03140130	DF-104		PT401	Note 10
C92	60	3000	03154014				Note 11
C93	.0082						Note 12
C94	68						Note 13

Note 3. Some versions use .022MFD in this application (Part No. 03140320).
Note 4. Used only in models having phono switch and tone control.
Note 5. Some versions use 4700MMF in this application (Part No. 03153740).
Note 6. Not used in some versions.
Note 7. Run 2 and run 3 chassis use .047MFD in this application.
Note 8. Not used in run 2 and run 3 chassis.
Note 9. Chassis prior to run 4 use .047MFD in this application.
Note 10. Not used prior to run 2. Run 2 and run 3 use .27MFD in this application.
Note 11. Chassis prior to run 4 use 55MMF in this application.
Note 12. Used only in run 2 and run 3 chassis.
Note 13. Used only prior to run 2.
Note 14. Not used prior to run 1.
Note 15. In VHF tuner, Part No. 89013552, use a 75MMF 5% in this application.
* Items C46A, C46B, C46C, R85A, R85B and R85C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA DUMONT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100K Ω	½	01058343	F1-31		GJ-524*	UE13325	Brightness (Panel) See Note 1.
B	1Meg	½		R3-41				Volume (Rear) (Tap at 45KΩ)
C	Switch			KB-1				Attach to R1B.
R2A	100KΩ	½	01058322					Brightness (Panel) See Note 2.
B	1Meg	½						Volume (Rear)
C	Switch							Attach to R2B.
R3A	50KΩ	½	01058333	F1-29		GJ-523A	UF54L	Horizontal Hold (Panel)
							†	See Note 1.
B	1.5Meg	½		R3-84			UR25L	Vertical Hold (Rear)
R3A	50KΩ	½	01058331	F1-29		GJ-724*	UF54L	Horizontal Hold (Panel)
							†	See Note 2.
B	1.5Meg	½		R3-84			UR25L	Vertical Hold (Rear)
	50KΩ	½	01058033					Horizontal Hold - See Note 2.
	1.5Meg	½	01058031					Vertical Hold-See Note 2.
R3A	15KΩ	½	01054571	ABT-154		QJ3-115XX		Contrast, Tap at 6KΩ and 12KΩ
B	Shaft		Not Req.	AK-4		Not Req.		Attach to R3A.
R4A	3Meg	½	01054581	AB-84	A47-3Meg-S	QJ1-160	U-59	Noise
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R4A.
C	Switch		Not Req.	KS-1	SWE-13	T6-1	US-36	Tone-See Note 4.
R5A	1Meg	½	01058034	AB-70	A47-1Meg-Z	QJ3-137	TA16A	Tone-See Note 4.
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R5A.
R6A	3Meg	½	01058041	BX-84	A47-3Meg-S	QJ1-160	TA34L	Vertical Size
B	Shaft		Not Req.	FK3-1/4	BQ	Not Req.		Attach to R6A.
R7A	500Ω	½	01058021	BX-10	A47-500-S	QJ1-114	TA31L	Vertical Linearity
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R7A.
R8A	1Meg	½	01058035	BX-88	A47-1Meg-S	QJ1-137	TA16L	Dumontior Note 5
B	Shaft		Not Req.	Not Req.	FK3-1/4	Not Req.	Not Req.	Attach to R8A.
R9A	500Ω	½	01058023	AB-10	A47-500-S	QJ1-114		Horizontal Size
B	Shaft		Not Req.	AK-1	FK3-1/4	Not Req.	Not Req.	Attach to R9A.
R10A	1Meg	½	01058035	BX-89	A47-1Meg-S	QJ1-127	TA16L	AGC Delay
B	Shaft		Not Req.	Not Req.	FK8-1/4	BQ	Not Req.	Attach to R10A.

Note 1. Used in chassis which use tone control and phono switch.
Note 2. Used in chassis which do not use tone control and phono switch.
Note 3. Used as an alternate in some versions of the chassis using tone control and phono switch.
Note 4. Used in some versions.
Note 5. Not used in chassis prior to run 3.
*CONCENTRIKIT EQUIVALENT; K-5 KIT, BASE ELEMENTS AND SHAFTS; B11-123, P1-034 (Panel)
B11-138, R11-031 (Rear)

†Universal Replacement (Mallory Exact Duplicate Part No. UE1045)
*CONCENTRIKIT EQUIVALENT; K-3 KIT, BASE ELEMENTS, AND SHAFTS; B11-128, P8-102 (Panel)
B17-137X, R1-118 (Rear)
764 (Switch)
▲CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS, AND SHAFTS; B11-123, P1-026 (Panel)
B11-138, R11-118 (Rear)

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA DUMONT PART No.	IRC PART No.	NOTES
R11	10KΩ	½	03031890	BTS-10K	
R12	22KΩ	½	03041830	BTS-22K	
R13	820KΩ 5%	½		BTS-820K 5%	
R14	820KΩ 5%	½		BTS-820K 5%	
R15	33KΩ	½	03033400	BTS-47O	
R16	680	½		BTS-680	
R17	47KΩ	½		BTS-47K	
R18	47KΩ	½		BTS-47OO	
R19	120Ω	½		BTS-120	
R20	4700Ω	½		BTS-4700	
R21	100KΩ	½	03033540		
R22	100KΩ	½	03033540		
R23	820Ω	½			
R24	100KΩ	½	03033540	BTS-1000	Note 5
R25	100KΩ	½	03034230		Note 1
R26	1500Ω	½		BTS-1500	
R27	470Ω	½	03032400	BTS-470	
R28	470Ω	½	03031810	BTS-47	
R29	56KΩ	½	03041980	BTS-56K	
R30	15KΩ	½	03031490	BTS-15K	
R31	470KΩ	1	03034870	BTA-47K	Note 9
R32	470Ω	½	03032400	BTS-470	
R33	68Ω	½	03031830	BTS-68	
R34	56KΩ	½	03031980	BTS-56K	
R35	470Ω	½	03032400	BTS-470	
R36	180Ω	½	03031660	BTS-180	
R37	2700Ω	½		BTS-2700	Note 2
R38	180KΩ 5%	½	03031020		Note 13
R39	1Meg	½	03031600		
R40	2700Ω	½		BTS-2700	Note 3
R41	56000Ω	2	03037880	BTS-5600	Note 4
R42	82000Ω	½	03031880		Note 6
R43	50000Ω	10	03113070	PW10-5000	
R44	270Ω	½	03031580	BTS-27	
R45	1Meg	½	03042850		
R46	100KΩ	½	03032300	BTS-100K	
R47	470KΩ	½	03032890	BTS-470K	Note 8
R48	120KΩ	½	03032020		Note 8
R49	1800Ω	½	03031800	BTS-1800	
R50	3900Ω	½		BTS-3900	Note 5
R51	270Ω	½	03032540		
R52	22KΩ	½	03031930		Note 9
R53	27KΩ	1	03034940		Note 8
R54	1.5Meg	½	03032270		
R55	1Meg	½	03031130		
R56	6.8Meg	½	03032310		
R57	1000Ω	½	03032420	BTS-1000	
R58	220Ω	½	03031690	BTS-220	
R59	330Ω	½	03031720	BTS-330	
R60	22KΩ	½	03041930	BTS-22K	
R61	12KΩ	½	03031900	BTS-12K	Note 6
R62	15KΩ	½	03031910	BTS-15K	
R63	15KΩ	½	03031910	BTS-15K	
R64	10Meg	½	02152560	BTS-10Meg	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA DUMONT PART No.	IRC PART No.	NOTES
R65	470KΩ	½	03033580	BTS-470K	
R66	470KΩ	½	03033580	BTS-470K	
R67	68OΩ	2	03038400	BTS-680	
R68	220Ω	1	03034690	BTA-220	
R69	39KΩ	½	03031930		
R70	330KΩ	½	03033020		
R71	1.5Meg 5%	½	03031280		
R72	33KΩ	½	03031950		
R73	330KΩ	½	03033070		
R74	22KΩ	2	03037930		
R75	56KΩ	½	03031980		
R76	68KΩ	½	03031940		
R77	470KΩ	½	03032090		
R78	470Ω	½	03031730	BTS-470	
R79	68OΩ	½	03031750	BTS-680	
R80	470Ω	½	03031730	BTS-470	
R81	470KΩ	½	03032090	BTS-470K	Note 14
R82	1.8MΩ	½	03032180		
R83A	22KΩ	½			
B	820KΩ	½	+88000851		
C	82000Ω	½			
R84	2.2Meg	½	03032630	BTS-2.2Meg	
R85	39KΩ	½	03034980		Note 22
R86	47KΩ	1	03034970		Note 23
R87	47KΩ	1	03034970	BTA-47K	Note 24
R88	15KΩ 5%	½	03030760		
R89	82OΩ	1	03034760		
R90	56OΩ	½	03041760	BTS-560	
R91	56OΩ	½	03041740	BTS-560	
R92	100KΩ	½	03032030	BTS-100K	
R93	10KΩ	½	03031890	BTS-10K	
R94	100KΩ	½	03032010	BTS-100K	
R95	4.7Meg	½	03032120	BTS-4.7Meg	
R96	680KΩ	½	03033110		
R97	15KΩ 5%	½	03030760		
R98	82KΩ	½	03032000		
R99	100KΩ	½	03032010	BTS-100K	Note 16
R100	100KΩ 5%	½	03030980	BTS-100K 5%	Note 16
R101	47OΩ	½	03032400	BTS-470	
R102	15KΩ 5%	½	03030760		Note 17
R103	270Ω 5%	½	03030580		Note 18
R104	68Ω	½	03032350		
R105	470KΩ	2	03032580		
R106	100Ω	1	03034770		Note 10
R107	330Ω	7	02151580	PW7-3300	Note 7, 12
R108	1000Ω	2	03032420	PW2-1000	Note 11
R109	150Ω	2	03037780		
R110	2.2Ω	1	02100750	BW1-2.2	
R111	1.2KΩ	10	02152630	SD-1250	
R112	100KΩ	1	03045030	BTA-100K	
R113	100KΩ	½			
R114	100KΩ	½			
R115	120KΩ	½			
R116	18KΩ	1			

Note 1. Some versions use a 22KΩ ½W resistor in this application.
Note 2. Some versions use a 3300Ω ½W resistor in this application.
Note 3. Some versions use a 4700Ω 1W resistor in this application.
Note 4. A 47OOΩ 5W resistor is used in chassis prior to code run 1.
Note 5. Not used in some versions.
Note 6. Used only in models with phono switch and tone control.
Note 7. A 4KΩ 7W (WW) resistor is used in chassis with a 17" picture tube.
Note 8. Not used in chassis prior to code run 4.
Note 9. Not used in chassis prior to code run 1.
Note 10. Not used in chassis prior to code run 2.
Note 11. Not used in chassis prior to code run 3.
Note 12. A 120KΩ ½W resistor is used in chassis prior to code run 1.
Note 13. A 180ΩΩ 5% resistor is used in chassis prior to code run 4.
Note 14. A 68OKΩ ½W resistor is used in chassis prior to code run 4.
Note 15. A 12OKΩ ½W resistor is used in chassis prior to code run 4.
Note 16. A 18OKΩ 5% resistor is used in chassis prior to code run 4.
Note 17. A 47OΩ 5% resistor is used in chassis prior to code run 4.
Note 18. A 68Ω 4W (WW) resistor is used in chassis prior to code run 3.
Note 19. Used in chassis prior to code run 1.
Note 20. A 47OKΩ ½W resistor is used in chassis coded run 1, run 2.
Note 21. Used in chassis coded run 1, run 2.
Note 22. A 82K ½W resistor is used in chassis prior to code run 4.
Note 23. A 39K ½W resistor is used in chassis prior to code run 4.
Note 24. A 56K ½W resistor is used in chassis prior to code run 4.
* Items C46A, C46B, C46C, R83A, R83B, R83C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA DUMONT PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	470VCT	5VAC	30009015			P-2830①			R-60BX①
	②1.82A	.300ADC	③ 6A							
	SEC 3	SEC 4	SEC 5							
	6.3VAC									
	④9.8A									

① Parallel and phase 6.3V windings for Sec. #3.
② Parallel and phase 6.3V ④ 6A windings for Sec. #3. Taps 6.3V ⑤ 1.25A

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	DUMONT PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	20009391	FBU1 &	HVO-36 *	2327I *	X090 *	A-8255 *	FLY-38 *	D-35 *
		20009681 ①	RF500 *						
T3	Vert. Output Trans.	20009231	21806	A-3039	2267I	V31I	A-8141	26854	A-104X
		20009021 ②							
T4A	Yoke-Horiz. (28MH)	89013272	DF604①④	MDF-75		Y70P25①④	DY-15A①	Y-18①④	Y-19①④
B	Vert. (37MH)	89013571 ①						④	

① Used in early production chassis coded runs 2 and 3.
② Alternate Dumont part number.
③ Use original yoke rear cover and centering device.
④ Use original horizontal damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
9	9	9	10	1	5	3	10
						Jumper 2 & 10	
2	7	5	8	3	4	Jumper 7 & 8	8
1	3	1	3	4	3	4	3
7	RF500 Term. #3	6	1	5	7	AGC Winding	1
8	RF500 Term. #4	2	7	6	2	AGC Winding	2
Special Notes →	⑤					⑥	

⑤ If picture is out of phase, reverse RF500 terminals.
⑥ If picture is out of phase, reverse AGC winding terminals.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA DUMONT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	4.4KΩ	R16	20009701	RF501	A-3900 ①	A-8349 ①	24681 ① ③	S-51X ①	① Drill one new mounting hole.
		4Ω				③		③	③ Use correct secondary tap.
		Tap ④							
		8Ω							

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA DUMONT PART No.	QUAM PART No.	NOTES
SP1	8"	PM	3.2Ω	18003681	6A1	
SP2	8"	PM	3.2Ω	18003581	6A1	
	5"	PM	3.2Ω	18003601	5A1	
	10"	PM	3.2Ω	18003611	10A1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA DUMONT PART No.	MUSSMER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	VHF Ant. Matching Trans.	.2Ω	.2Ω	20009261				
L2	VHF Ant. Matching Trans.	.2Ω	.2Ω	20009261				
L3	VHF Ant. Coils	0Ω						
L4	VHF Ant. Shunt Coils	0Ω						
L5	VHF RF Coil	0Ω		21013761				Channel 13
L6	UHF IF Input Coil	60CT		20009251				
L7	Fil. Choke	0Ω						
L8	Neut. Coil	0Ω						
L9	VHF RF Coil	0Ω		21013763				Channel 13
L10	VHF RF Coils	0Ω						
L11	Coupling Coil							
L12	Low Band Coupling Strap	0Ω						
L13	RF Trans.	0Ω	0Ω	20009261				
L14	VHF Mixer Grid Coil	0Ω		21013763				Channel 13
L15	VHF Mixer Grid Coils	0Ω						
L16	VHF Osc. Coil	0Ω		21013301				Channel 13
L17	VHF Osc. Coils	0Ω						
L18	VHF Osc. Coil	0Ω		21013771				Channel 6
L19	Conv. Plate	.3Ω	0Ω	20009551				
L20	1st Video IF	.2Ω		20008745		TV-134		Includes 43.25MC Trap
L21A	41.25MC Trap	0Ω						
B	47.25MC Trap	0Ω		21013421				
L22	Fil. Choke	0Ω		21011763	19-1001		4804	1.5 Microhenries
L23	2nd Video IF	.1Ω	.1Ω	20008991	17-4534	TV-135	6215	
L24	Fil. Choke	0Ω		21011763	19-1001		4804	1.5 Microhenries
L25	3rd Video IF	.1Ω	.1Ω	20008991	17-4533	TV-130	6215	
L26	Fil. Choke	0Ω		21011763	19-1001		4804	1.5 Microhenries
L27	4th Video IF	.1Ω	.1Ω	20008991	17-4534	TV-135	6215	
L28	Series Peaking Coil	6Ω		21013451			4436	27 Microhenries
L29	Shunt Peaking Coil	10.5Ω		21006828	19-4301	TV-134	6154	197 Microhenries
L30	Series Peaking Coil	7Ω		21006832	19-2100	TV-131	6177	100 Microhenries
L31	Series Peaking Coil			21006828	19-4301	TV-134	6154	197 Microhenries; Not used in some versions.
L32	4.5MC Trap	2.1Ω		21010964	30-1004	TV-131	1462	
L33	Shunt Peaking Coil	7.3Ω		21006829	19-2500		6174	500 Microhenries
L34	Series Peaking Coil	8.5Ω		21006830	19-3160		6153	160 Microhenries-Note 1
L35	Sound IF	1.8Ω		21013213	30-1004	TV-131	1462	
L36	Ratio Det.	5.5Ω	.8OCT	20009041	17-5497*	TV-119*	6303*	Tertiary windings, TG
L37	Horiz. Osc.	35Ω		21010991	19-1376	TV-165	6210	
L38	RF Choke	6.1Ω		21006550	19-1005		6813	5.3 Microhenries; IRC Part No. CL-1
L39	RF Choke	2.3Ω		21006530	19-1003		4606	4.7 Microhenries; IRC Part No. CL-1

* Use adaptor plate.
Note 1. Used only in chassis where L31 is not used.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	REPLACEMENT DATA INDUCTANCE @ CURRENT DUMONT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L40	.300ADC	36Ω	1.2 HY	21010953	C5037	C-2990①	C-2324①	26C44 ①	C-17X

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

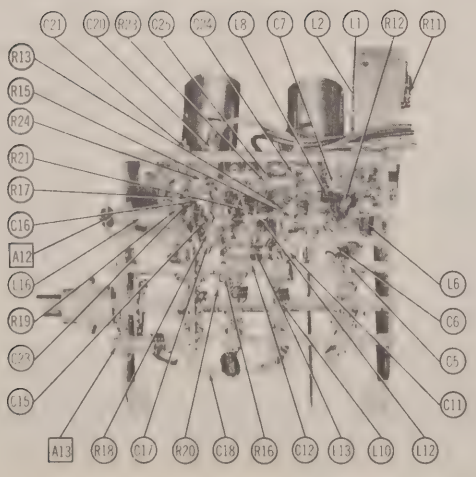
FUSES

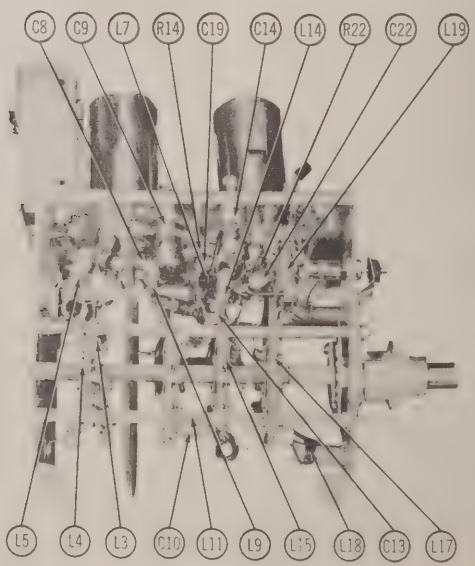
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			DUMONT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	3/8A	*	13110001	312.375 (3AG 3/8A)	357001	AGC 3/8	4405

* Note 1. Some versions use 3/4A fuse-Part No. 11005230.

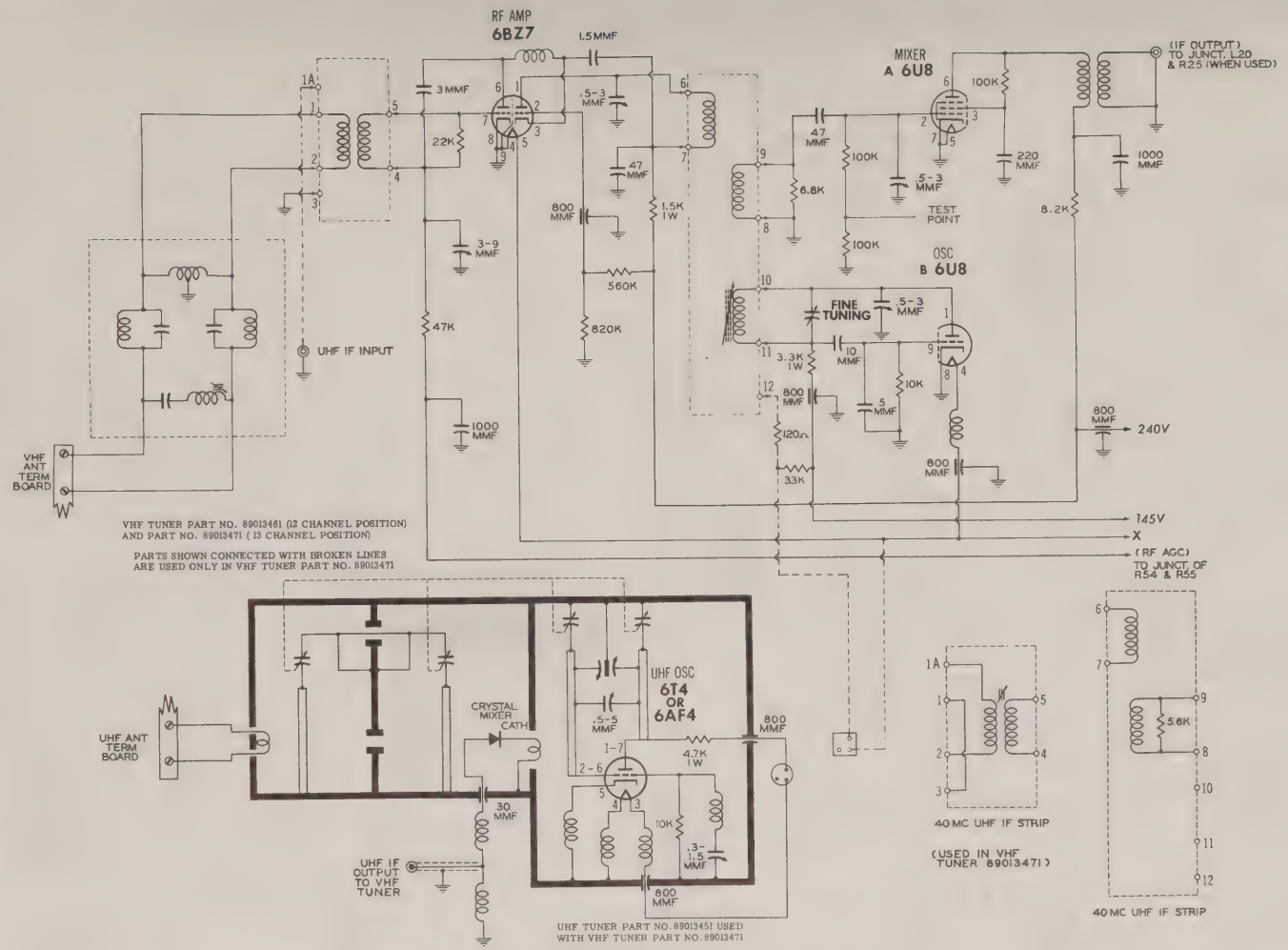
MISCELLANEOUS

ITEM No.	PART NAME	DUMONT PART No.	NOTES
M2	Dial Light	12001310	#47-Used only in models having phono switch & tone control.
M3	Tuner	89013551	VHF-Not used in all versions of chassis RA-312.
	Tuner	89013561	VHF-Used in earlier versions of chassis RA-312.
	Tuner	89013531	VHF-Used in earlier versions of chassis RA-312.
	Tuner	89013461	VHF-Used in some versions of chassis RA-312.
M4	Tuner	89013492	UHF-VHF combination-Used in some versions of chassis RA-313; Consists of VHF tuner, Part No. 89013471 & UHF tuner Part No. 89013451.
	Tuner	89013491	UHF-VHF combination-Used in some versions of chassis RA-313; consists of VHF tuner, Part No. 89012912, & UHF tuner Part No. 89013293.
	Tuner	89013493	UHF-VHF combination-Used in some versions. of chassis RA-313; consists of VHF tuner Part No. 89013552, & UHF tuner Part No. 89013581.
M5	Trap	88000861	VHF Ant. Input Filter-Used with VHF tuner Part No. 89013461 & 89013471.
M6	Switch	05005120	TV-Phono (3PDT-Slide type)-Not used in some versions.
M7	Centering device	29000771	Includes deflection yoke (T4) rear cover.
M8	Ion Trap	29000663	
	Knob	45005966	Fine tuning-Chassis RA-313
	Knob	45005975	Brightness-Chassis RA-313
	Knob	45005775	Channel selector (14 position)-Chassis RA-312, Baylor, Clifford, Dellwood, Richfield, Hamilton, & Belvidere Models.
	Knob	45005773	Channel selector (Mahog. 14 position)-Chassis RA-312, Barton, Winsted, Bradley Models.
	Knob	45005774	Channel selector (Blonde 14 position)-Chassis RA-312, Barton, Winsted & Bradley Models.
	Knob	45005776	Channel selector (14 position)-Chassis RA-313, Baylor, Clifford, Dellwood, Richfield, Hamilton, & Belvidere Models.
	Knob	45005771	Channel selector (Mahog. 14 position)-Chassis RA-313, Barton, Winsted, & Bradley Models.
	Knob	45005772	Channel selector (Blonde 14 position)-Chassis RA-313, Barton, Winsted, & Bradley Models.
	Knob	45005963	Fine tuning-Chassis RA-312, Baylor, Clifford, Dellwood, Richfield, Hamilton, & Belvidere Models.
	Knob	45005964	Fine tuning-Chassis RA-312, Barton, Winsted, & Bradley Models.
	Knob	45005973	Brightness-Chassis RA-312, Baylor, Clifford, Dellwood, Richfield, Hamilton, & Belvidere Models.
	Knob	45005974	Brightness-Chassis RA-312, Barton, Winsted, & Bradley Models,
	Knob	45006021	On-off-volume-Baylor, Clifford, Dellwood, Richfield, Hamilton, & Belvidere Models.
	Knob	45006022	On-off-volume (Mahog.) Barton, Winsted, Bradley Models.
	Knob	45006023	On-off-volume (Blonde), Barton, Winsted, Bradley Models.
	Dial	45005987	UHF-Chassis RA-313





RF TUNER RIGHT SIDE RF TUNER LEFT SIDE



UHF - VHF TUNER PART NO. 89 013 492 USED WITH IN SOME VERSIONS OF CHASSIS RA-313

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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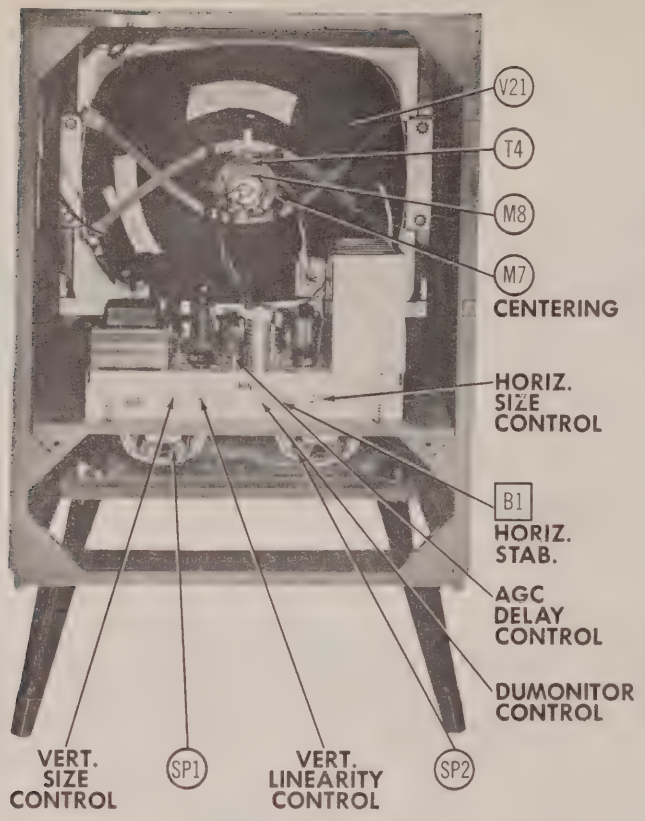
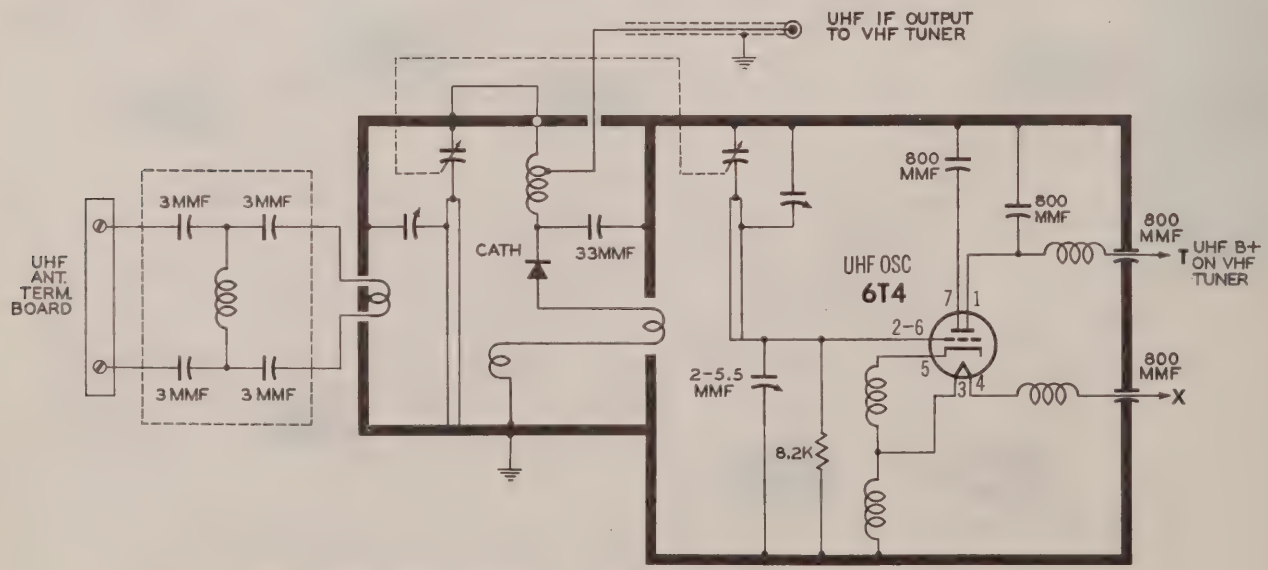
ALTERNATE UHF-VHF TUNER SCHEMATIC



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Tune in a TV station, preferably a test pattern.
Set the horizontal hold control at is mid-range position.
Adjust the horizontal stabilizer slug (B1) to the center of its effective synchronizing range, then momentarily remove signal by switching off channel and back again.
Picture should pull in sync. If it doesn't readjust B1 until picture pulls into sync.
Adjust the horizontal size control (R9) for a picture slightly sider than necessary to fill the picture mask horizontally.



UHF TUNER PART NO.89 013 581 USED WITH VHF TUNER
PART NO. 89 013 552 USED WITH SOME VERSIONS OF CHASSIS RA-313

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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UHF TUNER SCHEMATIC

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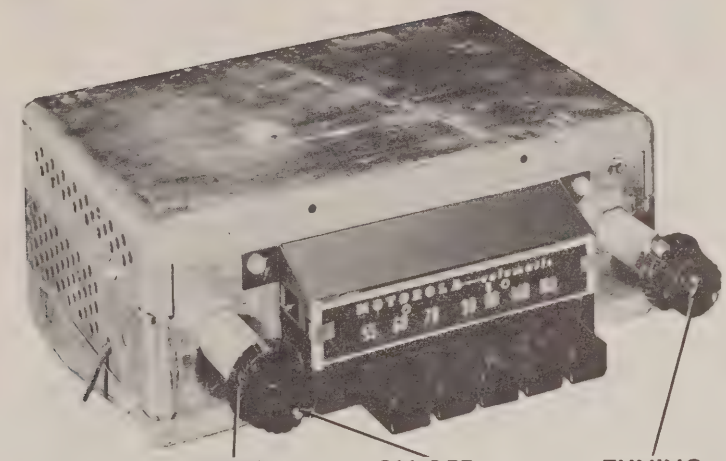

MOTOROLA
MODEL CTA4

TRADE NAME	Motorola Model CTA4 (For 1954 Chevrolet Cars)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Ill.
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Six)	Types: 6BD6 RF Amp., 6BE6 Conv., 6BD6 IF Amp., 6CR6 Det.-AVC-AF Amp., 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 5.6 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	540KC-1605KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading Use an insulated alignment screwdriver for adjusting.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~ Mod.)	High frequency end of dial (cores out)	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to ant. receptacle.	1605KC	"	"	A5	"
3.	"	"	1300KC	Tune to 1300KC signal.	"	A6, A7	"
*4.	"	"	1605KC	High frequency end of dial.	"	A5, A6, A7	Adjust for maximum output in order given. To prevent any effect on trimmer adj. (A5, 6 & 7) back tower cores out.
*5.	"	"	1180KC	Back tuner off 1 1/32" from high freq. end of dial to set up 1180KC.	"	A8, A9 A10	Adjust for maximum output.

* Necessary only if tuner has been tampered with or replacement of component has been made.

PUSH BUTTON ADJUSTMENT

Pull push button out (not off) and tune receiver manually to desired freq. Push push button in. Repeat this procedure on remaining push buttons.

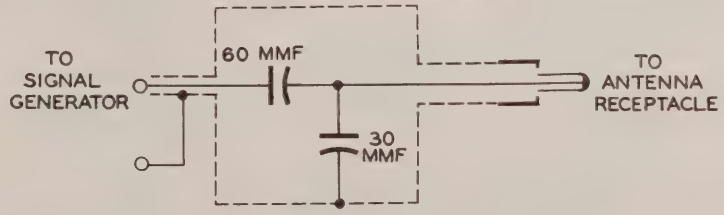

FIG. 1

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BD6	6BD6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BD6	6BD6	7BK	
V4	Det. -AVC-AF Amp.	6CR6	6CR6	7EA	
V5	Output	6AQ5	6AQ5	7BZ	
V6	Rect.	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	MOTOROLA PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■15	350	23A485677	FP328	TM-3026	T-455	
B	▲10	350					
C	20	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	90		21A591682				
C3	.006	400	8R121001		GP2-333-602	PT626	
C4	.05	200	8R121005	DF-503		PT415	
C5	.05	200	8R121005	DF-503		PT415	
C6	4.7		21R115955	TCZ-4R7	NPOA-4R7	ZT-555	
C7	100		21R120124	TCZ-100	NPO-337-101	ZT-531	
C8	47		21R115593	TCN-47	N750K-470	NT-5447	
C9	400		21A71872				
C10	.05	400	8R121567	DF-503		PT415	
C11	10000		21R482726	DD-103	811-01	DC511	
C12	1000		21R115860	D6-102	GP2L-102	UC-521	
C13	.02	400	8R121566	DF-203	817-02	PT412	
C14	.1	200	8R121573	DF-104		PT401	
C15	10000		21R482726	DD-103	811-01	DC511	
C16	470		21R115856	D6-471	GP2K-471	UC-5347	
C17	.006	400	8R121001		GP2-333-602	PT626	
C18	.03	1000	8K400883			PT1613	
C19	.5	100	8K-17028			RF480	
C20	.5	100	8K-17028			RF480	
C21A	300		21A522033				
B	300						

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	18B531553	F1-55		QJ-721A♦		Tone (Panel)
B	250KΩ	½		R4-37				Volume (Rear) Tap at 125KΩ.
C	Switch			KB-4				Attach to R1B.

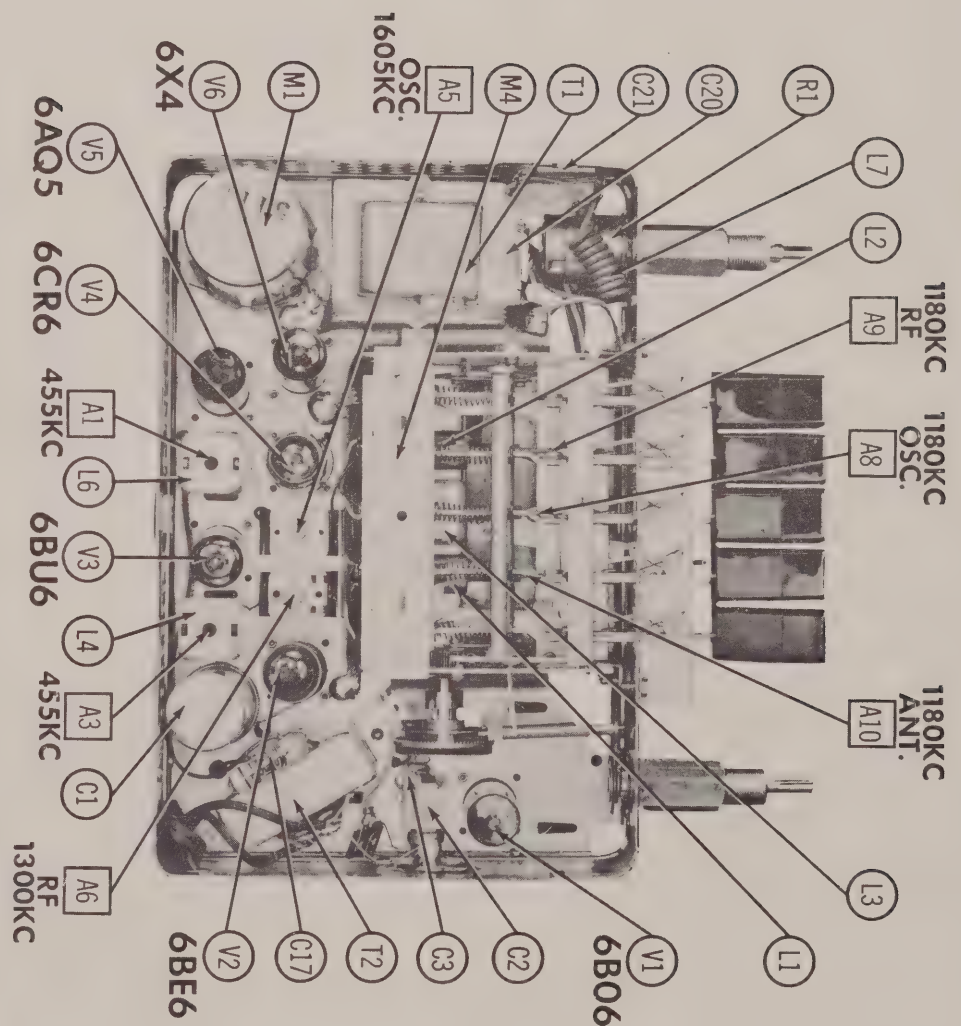
♦CONCENTRIKIT EQUIVALENT; K-6 KIT, BASE ELEMENTS AND SHAFTS; B11-137, P13-200 (Panel)
B13-130X, R1-212 (Rear)
76-1 Switch

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R2	1Meg	½	6R6004	BTS-1Meg	
R3	18KΩ	½	6R5591	BTS-18K	
R4	560Ω	½	6R6291	BTS-560	
R5	22KΩ	½	6R6028	BTS-22K	
R6	6800Ω	2	6R5690	BTB-6800	
R7	150Ω	½	6R6373	BTS-150	
R8	1Meg	½	6R6004	BTS-1Meg	
R9	2.2Meg	½	6R3927	BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R10	1Meg	½	6R6004	BTS-1Meg	
R11	15KΩ	½	6R2119	BTS-15K	
R12	220KΩ	½	6R6015	BTS-220K	
R13	270KΩ	½	6R6414	BTS-270K	
R14	270Ω	½	6R6432	BTS-270	
R15	2200Ω	2	6R476130	BTB-2200	
R16	56Ω	1	6R2037	BTA-56	
R17	56Ω	1	6R2037	BTA-56	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3VCT ②3A	470VCT .049A			25C501303					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7.3KΩ	3.6Ω	25B502330F	Z1003	A-3020	A-3878 ①	26S48	S-7X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3.6Ω	50C534258 50C513193 50C513195 50C513197 ① 50C513200 50C513544	69A3	① Alternate PM speakers.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	13Ω		24K522272				Core Part #76K522275
L2	RF Coil	13Ω		24B522271				Core Part #76K522275
L3	Osc. Coil	.7Ω	2.7Ω	24B522270				Core Part #76K522275
L4	Input IF	17Ω	17Ω	24C485553	16-6758	BC-352	12-C1	
L5	Fil. Choke	0Ω		24A522284	19-1001		4604	
L6	Output IF	17Ω	17Ω	24K485554	16-6770	BC-355	12-C6	
L7	Fil. Choke	0Ω		24K522091	19-4215		5221	1 Microhenry
L8	Vib. Hash Choke	.1Ω		24A512119				

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interruptor	6.3V	115∿	48B333	5342	903M	5342	

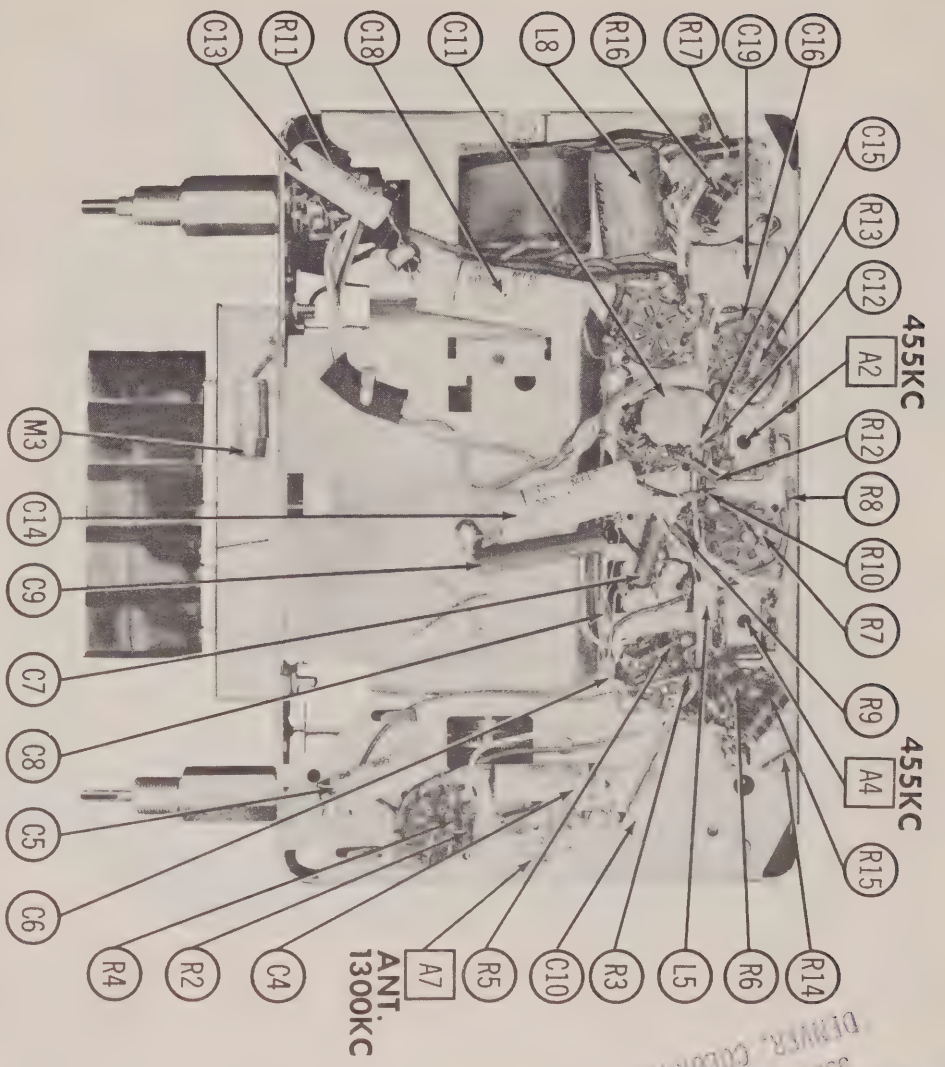
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	9A	65K16248	9K530099	307009. (SFE9A)	155009	SFE9	HRH

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Dial Light	65X10867	#44
M4	Tuner	77D522054	Permeability-Includes L1, L2, L3
A5	Trimmer Cap.	20A77537	Osc. (5-80MMF)
A6	Trimmer Cap.	20A481526	RF (20-180MMF)
A7	Trimmer Cap.	20A513232	Ant. (20-180MMF)
	Knob	36B530118	Tone
	Knob	36K530119	Dummy
	Knob	1V530175	On-Off-Volume & Tuning
	Push Button	1V520079	5 used
	Dial Scale	34B530121	
	Pointer Arm Assembly	1K522379	

CHASSIS—BOTTOM VIEW



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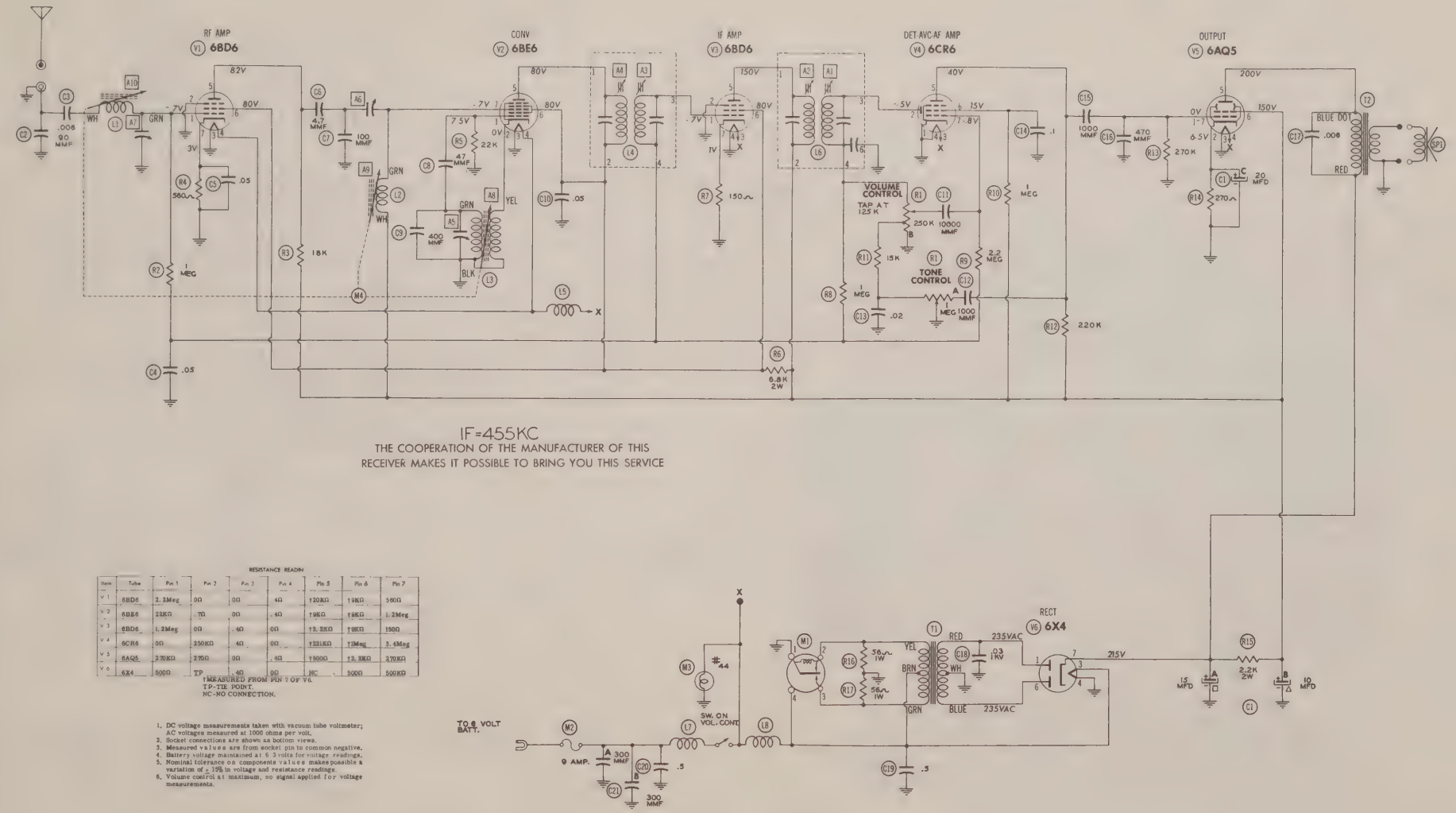

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READIN

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BD6	2.2Meg	0Ω	0Ω	4Ω	†20KΩ	†9KΩ	360Ω
V 2	6BE6	22KΩ	70	0Ω	4Ω	†9KΩ	†9KΩ	1.2Meg
V 3	6BD6	1.2Meg	0Ω	4Ω	0Ω	†2.2KΩ	†9KΩ	150Ω
V 4	6CR6	0Ω	250KΩ	4Ω	0Ω	†221KΩ	†1Meg	3.4Meg
V 5	6AQ5	270KΩ	270Ω	0Ω	4Ω	†500Ω	†2.2KΩ	270KΩ
V 6	6X4	500Ω	TP	4Ω	0Ω	NC	500Ω	500KΩ

†MEASURED FROM PIN 7 OF V6.
TP-TIE POINT.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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MOTOROLA MODELS 24T2, B, Y24T2, B (Ch. TS-609, Y)

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MOTOROLA MODEL 24T2

TRADE NAME	Motorola Models 24T2, 24T2B (Ch. TS-609), Y24T2, Y24T2B (Ch. TS-609Y)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Illinois
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC-60 Cycles — RATING 1.26 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 16
Parts List and Descriptions 12, 13, 14
Photographs
Cabinet-Rear View 16
Capacitor Identification 3, 10
Chassis-Top View 15
RF Tuner 16
Resistor Identification 4, 9
Photographs (Cont)
Trans., Inductor & Alignment Identification 15
Resistance Measurements 8
Servicing in the Field 1
Schematic (Alternate Tuner) 11
Schematic (TV) 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

MOTOROLA MODELS 24T2, B, Y24T2, B (Ch. TS-609, Y)

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from front panel of cabinet.

2. Remove 1 push-on type control knob. Also 9 wood screws and 1 metal screw. Remove rear cover.

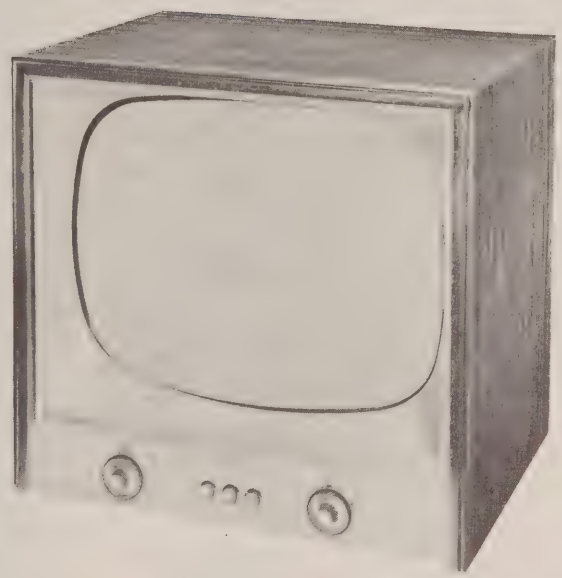
3. Remove 2 wood screws holding antenna terminal bracket.

4. Disconnect speaker plug.

5. Remove 4 chassis bolts. Remove chassis.

6. Remove 4 speaker nuts. Remove speaker.

NOTE: If it is necessary to remove chassis for servicing, it is also necessary to remove the speaker. The speaker is the electro-magnetic type and must be connected for proper operation.



MODELS	CHASSIS
24T2, 24T2B	TS-609
Y24T2, Y24T2B	TS-609Y

MOTOROLA MODELS 24T2, B, Y24T2, B (Ch. TS-609, Y)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

There are no touch-up adjustments of the VHF tuner oscillator circuit. Should alignment become necessary, see Alignment Instructions on pages 6 and 7.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 4 wood screws holding metal molding strip located along the top edge of of the safety glass. Remove molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

To adjust the horizontal oscillator, it is necessary to remove the rear cover and supply power to the set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary slug (A10) located on top of chassis. (See tube placement chart)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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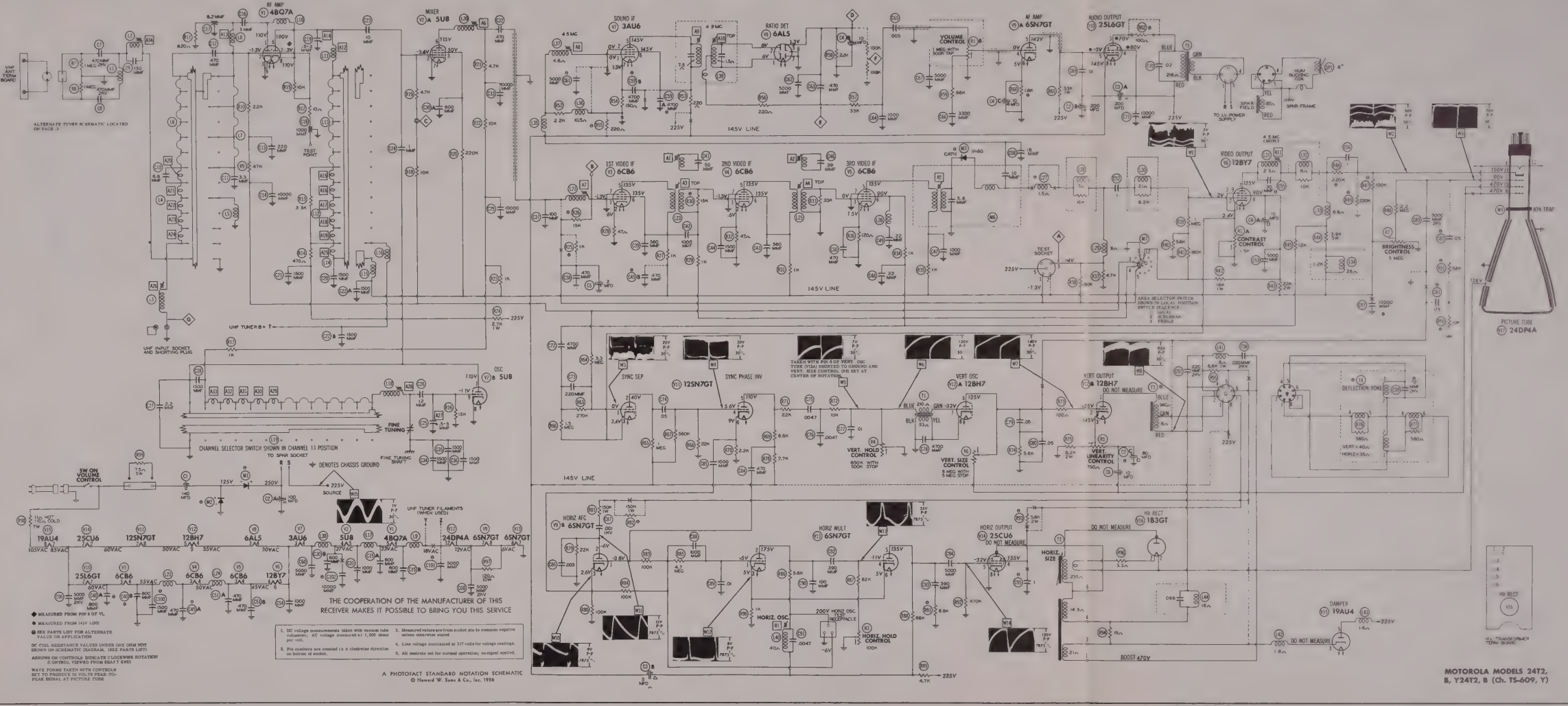
MOTOROLA MODELS
24T2, B, Y24T2, B (Ch. TS-609, Y)
RF AMP Y1 4BQ7A
MIXER Y2 A 5U8
SOUND IF Y7 3AU6
RATIO DET Y8 6AL5
AF AMP Y9 A 6SN7GT
AUDIO OUTPUT Y10 25L6GT
VOLUME CONTROL
1ST VIDEO IF Y1 6CB6
2ND VIDEO IF Y4 6CB6
3RD VIDEO IF Y5 6CB6
VIDEO OUTPUT W6 12BY7
4.5 MC (MIN.)
CONTRAST CONTROL
BRIGHTNESS CONTROL
ION TRAP
PICTURE TUBE Y17 24DP4A
TEST SOCKET
AREA SELECTOR SWITCH SHOWN IN LOCAL POSITION
SWITCH SEQUENCE
LOCAL
SUBURBAN
FRINGE
VHF ANT. TERM. BOARD
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE 3
UHF TUNER B+ T
UHF INPUT SOCKET AND SHORTING PLUG
OSC Y7 B 5U8
FINE TUNING
FINE TUNING SHAFT
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
TO SPKR SOCKET
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
SOURCE
UHF TUNER FILAMENTS (WHEN USED)
145V LINE
SYNC SEP
SYNC PHASE INV
12SN7GT
VERT OSC
12BH7
VERT. HOLD CONTROL
VERT. SIZE CONTROL
VERT OUTPUT
DO NOT MEASURE
VERT. LINEARITY CONTROL
DEFLECTION YOKE
HORIZ AFC
6SN7GT
HORIZ MULT
HORIZ OUTPUT
25CU6
HV RECT
1B3GT
HORIZ. SIZE
BOOST 470V
HORIZ. OSC
HORIZ. HOLD CONTROL
200V HORIZ OSC. TEST RECEPTACLE
DAMPER
19AU4
HV RECT
HV TRANSFORMER TERM BOARD
19AU4 105VAC 85VAC
25CU6 60VAC
12SN7GT 50VAC
12BH7 35VAC
6AL5 30VAC
3AU6 30VAC
5U8 120VAC
4BQ7A 23VAC
18VAC
12VAC
24DP4A 12V
6SN7GT 8A
6VAC
25L6GT 60VAC
6CB6 55VAC
6CB6 50VAC
6CB6 45VAC
12BY7 150VAC
MEASURED FROM PIN 8 OF V1.
MEASURED FROM 145V LINE
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. SEE PARTS LIST.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
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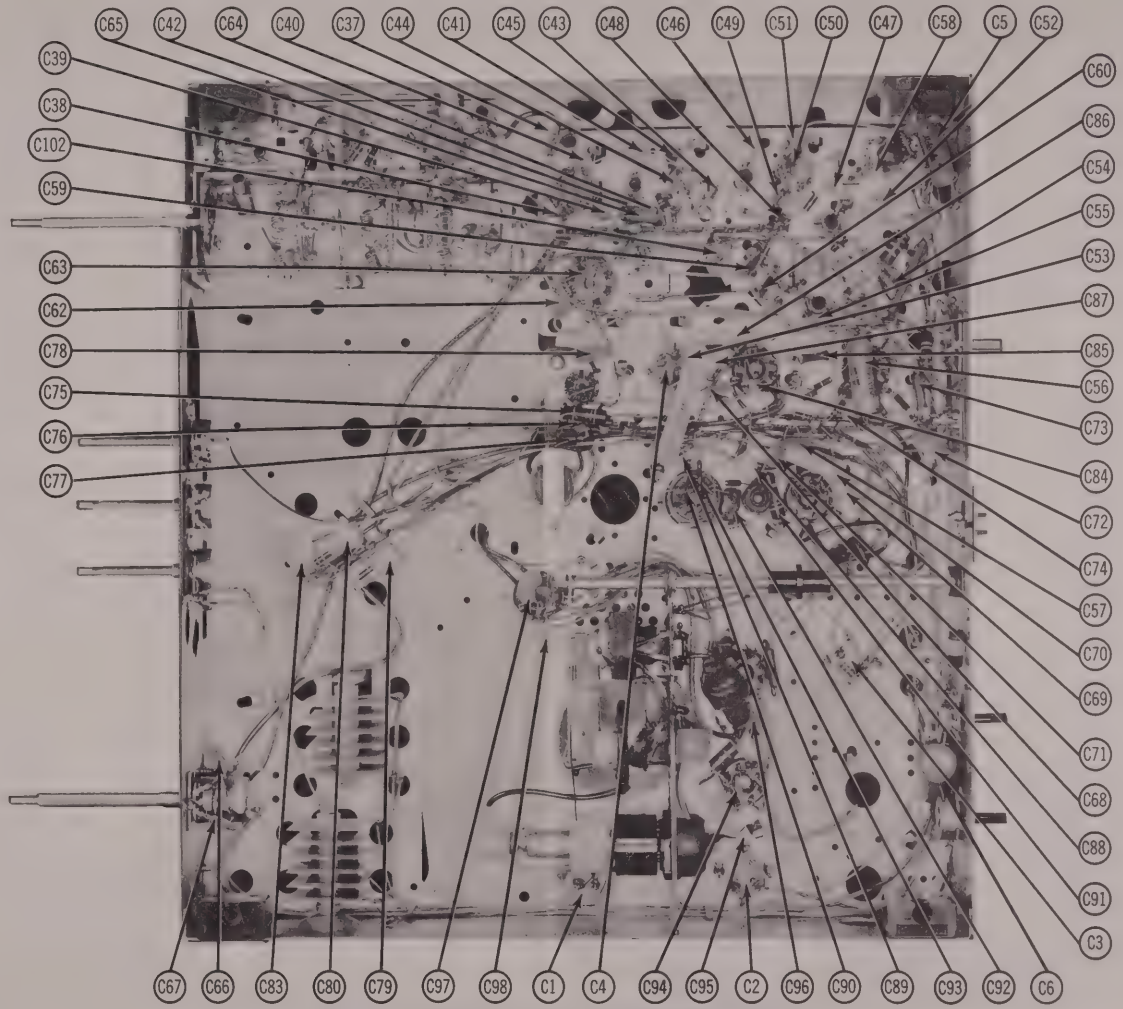
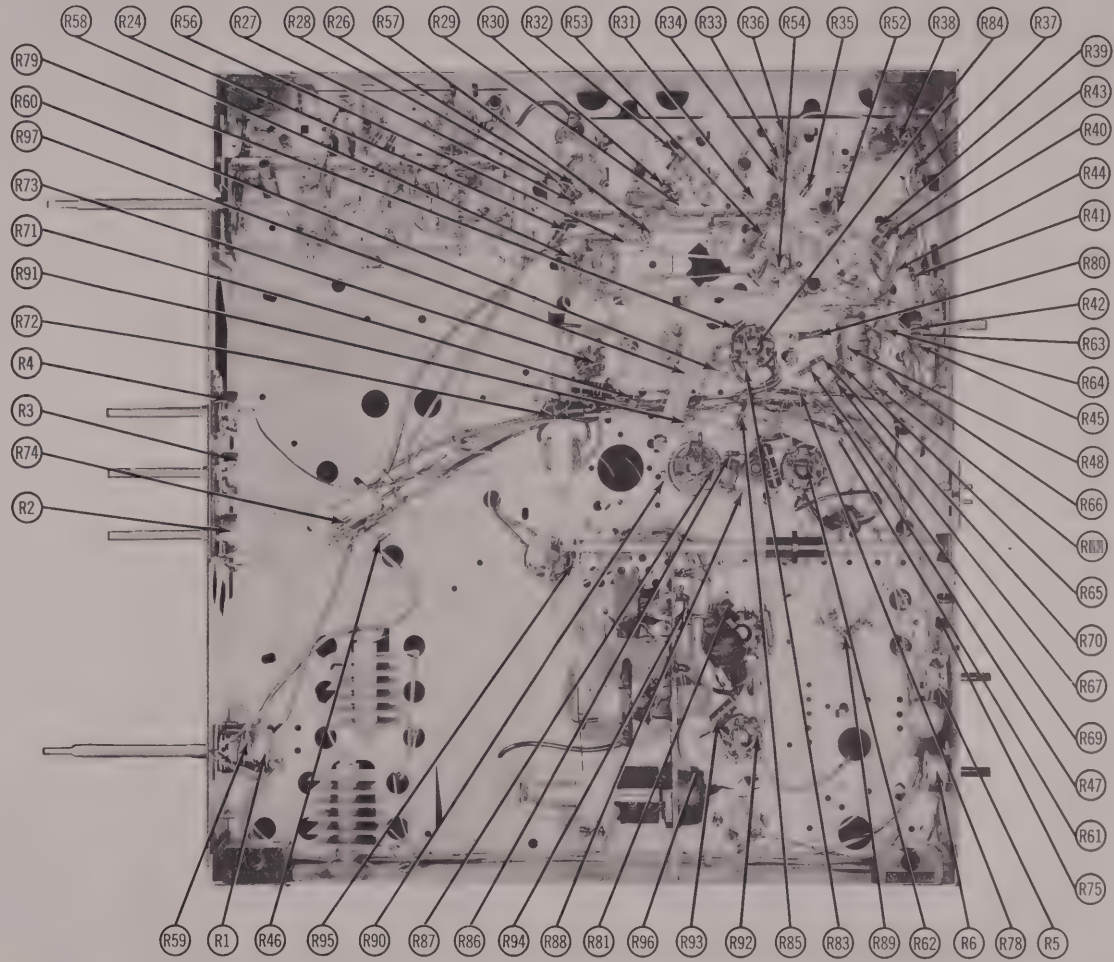
MOTOROLA MODELS 24T2, B, Y24T2, B (Ch. TS-609, Y)



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



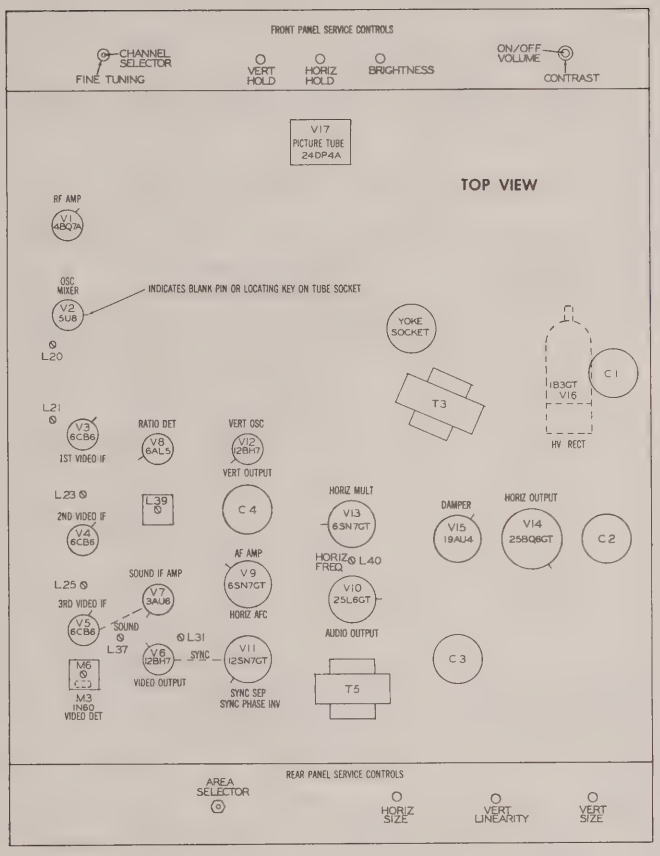
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF

MOTOROLA MODELS
24T2, B, Y24T2, B (Ch. TS-609, Y)

PROPERTY OF
L. F. CLARKENSHIP
3124 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

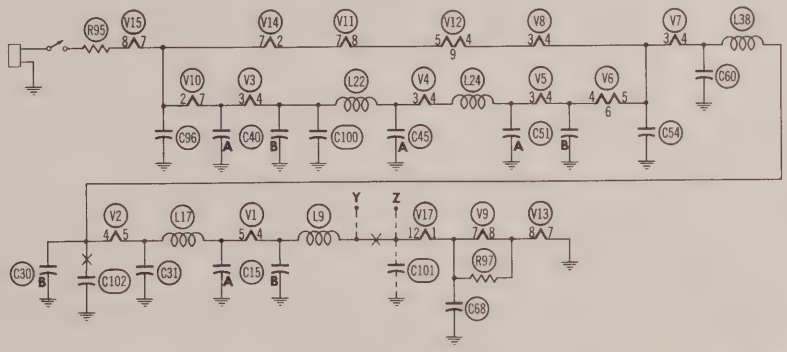
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V10**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V17**
Has pic, no sound - **V7, V8, V9, V10**

SYNC FAILURE
No vert. sync - **V11, V12**
No horiz. sync - **V9, V11, V13**
No vert. or horiz. sync - **V11**

SWEEP FAILURE
No raster, has sound - **V13, V14, V15, V16, V17**
No vertical deflection - **V12**
Poor vert. linearity or foldover - **V12**
Poor horiz. linearity or foldover - **V13, V14, V15**
Narrow picture - **V13, V14, V15, V16, M1, M2**
Vert. off freq. - **V11, V12**
Horiz. off freq. - **V9, V11, V13**

NOTE: Since this receiver employs tubes used in series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative (See circuit below).



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
Maintain 117V line voltage, if necessary use a variac.
Disconnect yoke from plug connection. This will eliminate the high voltage shock hazard and reduce scope interference during alignment. Connect a 2500Ω 10 watt resistor between pin 5 of service test receptable and chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to pin 1 of service test receptable. Connect the positive lead to chassis. Disable the local oscillator by shorting pin 9 (grid) of 5U8 (V2B) to chassis with a short clip lead.
The IF coils and traps have two points of resonance. The correct setting are with the cores away from the center of the coil form so as not to affect coupling between coil and trap windings.
Set contrast control fully counter clockwise.
Set area selector switch to its "local" position.
Attenuate the sweep generator to maintain 3 to 5 volts peak to peak at point Ⓓ. If sweep generator has no built in markers, loosely couple the output of an accurately calibrated AM signal generator to the video IF test strip (point Ⓓ). Attenuate marker generator low enough to prevent distortion of the response curves.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1	005MFD	High side to point Ⓓ. Low side to chassis.	44MC (10MC Swp)	41.25MC	13	Vert. Amp. thru 47KΩ to point Ⓐ. Low side to chassis.	A1	Adjust so that trap notch falls at 41.25MC. Use sufficient generator output so that trap notch is clearly defined (Fig. 1).
2.	"	"	"	47.25MC	"	"	A2	Adjust so that trap notch falls at 47.25MC. Temporarily remove the -3 volt bias to provide better trap notch definition (See Fig. 1).
3.	"	"	"	42.25MC	"	"	A3	Adjust to place 42.25MC marker at 50% on response curve as in Fig. 1.
4.	"	"	"	45.75MC	"	"	A4, A5	Adjust A4 to place 45.75MC marker at 60% on high side of response curve. Simultaneously adjust A5 for flat-top and symmetrical response similar to Fig. 1.
5.	"	High side to point Ⓓ. Low side to chassis.	"	41.25MC 42.25MC 45.75MC 47.25MC	"	"	A6, A7	Simultaneously adjust A6 and A7 for response similar to Fig. 2 . A6 positions curve and A7 has leveling effect. If necessary, retouch A1 thru A5 for desired response with correct marker positions as in Fig. 2. Increase sweep generator output to observe 41.25MC and 47.25MC trap markers.

REGENERATION CHECK

Leave pin 3 of V2B shorted to chassis and remove the 3 volt bias supply. With generator and scope connected as in step 5, observe response curve. Any regeneration will be indicated by sharp peaks on the response curve. Remove short from pin 3 of V2B and chassis.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓔ to chassis. The junction of these two resistors is alignment point Ⓔ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	Direct	High side to point Ⓐ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru 10KΩ to point Ⓔ. Common to chassis.	A8, A9	Adjust for maximum deflection.
7.	"	"	"	"	DC probe to point Ⓔ. Common to point Ⓔ.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Check steps 6 and 7 for best accuracy.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 80% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to point Ⓐ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point Ⓔ. Low side to chassis.	A8, A9	Disconnect stabilizing capacitor C4B. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
7.	"	"	"	"	"	Vert. Amp. to point Ⓔ. Low side to chassis.	A10	Reconnect stabilizing capacitor C4B. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

This method provides an accurate signal source. Tune in a TV station. See steps 6 and 7 of "Sound IF Alignment Using AM Signal Generator and VTVM" for VTVM connections and for adjustment of A8, A9 and A10.

4.5MC TRAP ALIGNMENT

Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	Direct	High side to point Ⓐ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru detector (Fig. 5) to pin 11 (cathode) of picture tube. Common to chassis.	All	Adjust for MINIMUM deflection.

ALTERNATE 4.5MC TRAP ALIGNMENT

Tune in a local TV station, adjust fine tuning control until a noticeable 4.5MC beat appears in the picture. Adjust All for minimum 4.5MC beat in the picture. Adjust All so that the core is approximately centered between the points where the 4.5MC beat appeared in the picture.

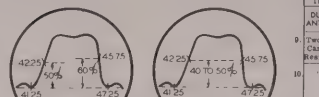


FIG. 1

FIG. 2

FIG. 3

FIG. 4

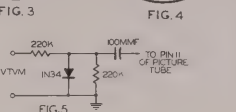


FIG. 5

FIG. 6

FIG. 7

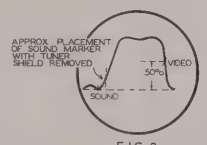


FIG. 8

RF AND MIXER ALIGNMENT

Set the area selector switch to "Fringe" position. Use only enough sweep generator output for useable pattern on scope. Remove tuner shield.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis.	A13, A13	Adjust for maximum amplitude and response similar to Fig. 8. Adjust by compressing or expanding coil turns.
10.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A14	Adjust for response similar to Fig. 8. Be sure all markers fall within limits shown. Recheck channel 13. If necessary, retouch A13 adjustment slightly.
11.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check for response curve similar to Fig. 8. on each channel. If response is checked with tuner shield cover in place the video marker will move up the curve a short distance, but markers should be within limits).
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			193MC (10MC Swp)	191.25MC 195.75MC	10			
			187MC (10MC Swp)	185.25MC 189.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
12.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A15, A20	Adjust A15 by compressing or expanding coil turns to obtain response similar to Fig. 7 with markers not falling below 60%. Usually the antenna coils A30 thru A34 are not to be adjusted. If the antenna coils have been distorted, they may be adjusted by compressing or expanding coil turns for maximum response in conjunction.
13.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A18, A21	Adjust A18 by compressing or expanding coil turns for response similar to Fig. 7. For A21 adjustment see remarks in step 13.
14.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A17, A23	Adjust A17 for response similar to Fig. 7. For A23 adjustment see remarks in step 13.
15.	"	"	65MC (10MC Swp)	63.25MC 65.75MC	3	"	A16, A33	Adjust A16 for response similar to Fig. 7. For A33 adjustment see remarks step 13.
16.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A19, A34	Adjust A19 for response similar to Fig. 7. For A34 adjustment see remarks in step 13. Replace tuner shield and recheck channels 13 thru 2. Response on channels 6 thru 2 must be similar to Fig. 7 with marker not falling below 60% on response curve.
17.	Direct	High side to point Ⓓ. Low side to chassis. (See remarks)	44MC (10MC Swp)	43.25MC 45.75MC	UHF or Channel 1 position	"	A35, A36	Remove tuner shield. Remove UHF shorting plug at point Ⓓ. Preset A36 slug maximum clockwise. Adjust A35 and A36 for response similar to Fig. 7. A35 is adjusted by expanding or compressing coil turns. Replace UHF shorting plug.

OSCILLATOR ALIGNMENT

Remove shorting jumper from pin 9 of V2B and chassis. Replace the 3 volt bias supply as under "Video IF Alignment".
Use only enough sweep generator output from generator to produce useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	185MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis.	A37	Adjust to place sound marker SLIGHTLY higher than the sound trap notch. This allowance must be made due to removal of the tuner shield. With shield replaced, the sound marker should move down into the notch. Check channels 7 thru 13 noting if sound marker for each channel falls just above the trap notch. Response should be similar to Fig. 8. If more than a 30 degree rotation of fine tuning control is necessary to place sound marker in proper position on any high band adjust A36. If A28 is adjusted it may be necessary to readjust A37 on channel 10.
			213MC (10MC Swp)	211.25MC 215.75MC	13			
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			193MC (10MC Swp)	191.25MC 195.75MC	9			
			187MC (10MC Swp)	185.25MC 189.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
19.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6		A29	Check to see that fine tuning is set at its mid-range position. Adjust A29 by compressing or expanding coil turns to place sound marker in trap notch (Fig. 8).
	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A30	Adjust by expanding or compressing coil turns to place sound marker just above trap notch (Fig. 8) with fine tuning set within 15 degrees of mid-position.
			69MC (10MC Swp)	67.25MC 71.75MC	4		A31	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A32	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A33	

45.0MC TRAP ALIGNMENT

Instructions same as for "RF and Mixer Alignment".

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	45MC (10MC Swp)	45MC	2	Vert. Amp. to point Ⓒ. Low side to chassis.	A36	Increase sweep generator output to produce visible marker on scope. Adjust A36 for MINIMUM response at 45MC.

IF SENSITIVITY MEASUREMENT

Set contrast control for minimum contrast (fully counter clockwise). Set area selector switch to "Fringe" position. Set channel selector to channel 13. Connect the high side of an AM signal generator to point Ⓓ. Low side to chassis. Set signal generator to 45.0MC. Connect the DC probe of a VTVM to point Ⓐ. Common to chassis. A signal less than 500 microvolts from the generator should produce one volt at VTVM. Short out R19 with a clip lead and move high side of signal generator to point Ⓓ. Low side to chassis. A signal less than 60 microvolts from the generator should produce one volt at VTVM. Remove short from R19.

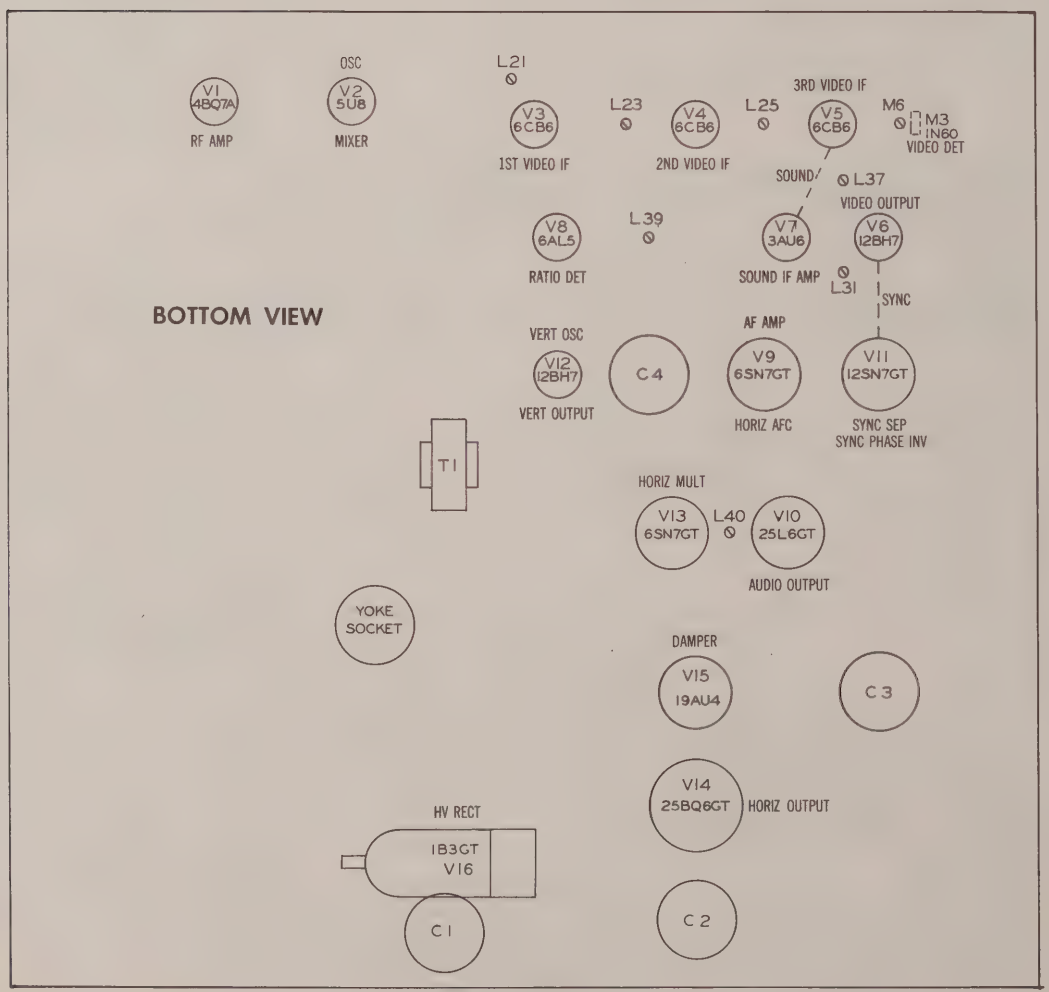
UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

RESISTANCE MEASUREMENTS

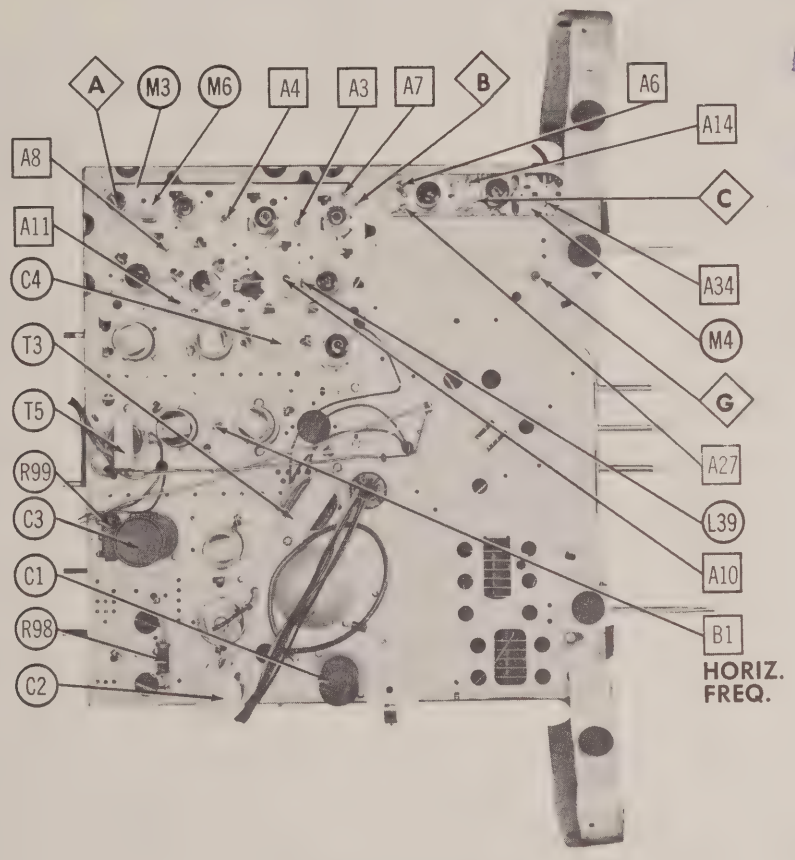
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	4BQ7A	INF	260KΩ	0Ω	5Ω	7Ω	†3. 3KΩ	INF	INF	0Ω
V 2	5U8	■2KΩ	200KΩ	■220KΩ	8Ω	7Ω	■16KΩ	0Ω	0Ω	15KΩ
V 3	6CB6	180KΩ	47Ω	20Ω	18Ω	■1KΩ	■1KΩ	0Ω		
V 4	6CB6	180KΩ	47Ω	18Ω	17Ω	■1KΩ	■1KΩ	0Ω		
V 5	6CB6	.1Ω	120Ω	17Ω	15Ω	■1KΩ	■17KΩ	0Ω		
V 6	12BY7	100Ω	1Meg	100Ω	15Ω	9Ω	12Ω	■3. 9KΩ	■22KΩ	100Ω
V 7	3AU6	2. 2KΩ	0Ω	9Ω	8Ω	■220Ω	■220Ω	150Ω		
V 8	6AL5	INF	INF	1Ω	9Ω	22KΩ	0Ω	0Ω		
V 9	6SN7GT	300KΩ	22KΩ	100KΩ	300KΩ	†33KΩ	1. 8KΩ	3Ω	2Ω	
V 10	25L6GT	TP	22Ω	†400Ω	†87Ω	†33KΩ	TP	20Ω	30KΩ	
V 11	12SN7GT	1. 2Meg	■1Meg	100Ω	22KΩ	■9. 5KΩ	2. 2 KΩ	20Ω	16Ω	
V 12	12BH7	▲1KΩ	▲2. 7Meg	8. 2KΩ	1Ω	16Ω	▲2. 7Meg	600KΩ	50Ω	14Ω
V 13	6SN7GT	5Meg	†10KΩ	1KΩ	180KΩ	†70KΩ	1KΩ	0Ω	2Ω	
V 14	25CU6	TP	20Ω	NC	†5. 6KΩ	470KΩ	TP	22Ω	0Ω	TOP CAP ▲32Ω
V 15	19AU4	NC	TP	650KΩ	TP	†90Ω	TP	22Ω	26Ω	
V 16	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲270Ω
V 17	24DP4A	3Ω	■3. 5Meg	PIN 6 ▲19Ω	PIN 10 ▲19Ω	PIN 11 †120KΩ	PIN 12 5Ω			

†MEASURED FROM POSITIVE SIDE OF C2A.
■MEASURED FROM 145V LINE.
▲MEASURED FROM PIN 3 OF V15.
TP-TIE POINT.
NC-NO CONNECTION.

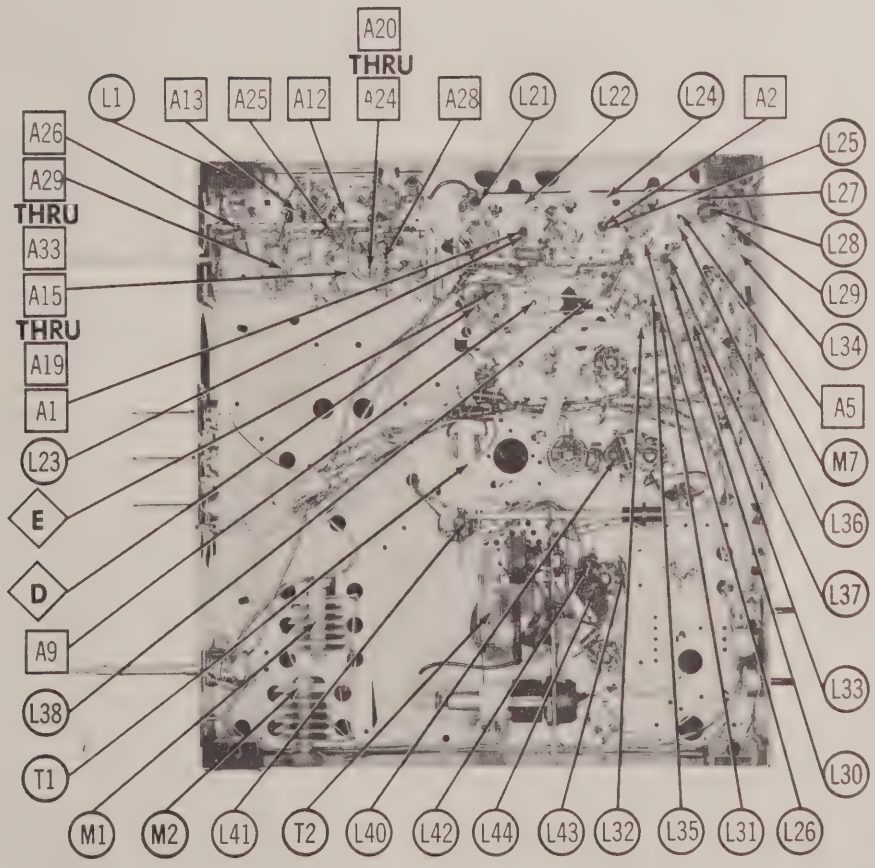


TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amp.	4BQ7A	4BQ7A	8AZ	
V2	Mixer-Osc.	5U8	5U8	8AE	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7	12BY7	9BF	
V7	Sound IF Amp.	3AU6	3AU6	7BK	
V8	Ratio Det.	6AL5	6AL5	6BT	
V9	AF Amp. - Horiz. AFC	5SN7GT	5SN7GT	8BD	
V10	Audio Output	25L6GT	25L6GT	7AC	
V11	Sync Sep. - Sync Phase Inv.	12SN7GT	12SN7GT	8BD	
V12	Vert. Osc. - Vert. Output	12BH7	12BH7	8A	
V13	Horiz. Mult.	5SN7GT	5SN7GT	8BD	
V14	Horiz. Output	25C5G	25C5G	6AM	
V15	Damper	1BA5A	1BA5A	6CG	
V16	HV Rect.	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: MOTOROLA PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V17	24DP4A ①	24DP4A ①	24DP4A ①	24DP4A ② 24DP4	24DP4 ①	12L 13L	① Aluminized ② Silver Screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: MOTOROLA PART No	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	NOTES
C1	140	150	23S494097	FPI17	TM-140-150	T-055	
C2A	▲100	300	23S73596			Q-163	
B	▲200	150					
C	●80	300					Note 1
C3A	▲200	150	23S71094L	FP216.1		D-088	
B	▲5	50					
C4A	●10	350	23S73030S	FP350.5	TM-T10-300	T-095	
B	10	50					
C	▲10	50					
C5	2	10	23A73230S	TC302	TD-2-25	MMT-0505	
C6	10	450	23A70245D	TC79	TD-10-450	FM-4510	

Note 1. C3C is rated at 150 volts in some versions. (Part No. 23S73163D)

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C1	470	2000	21RI21476	DD30-471	3KV-471	DC30347	
C2	470	2000	21RI21478	DD30-471	3KV-471	DC30347	
C9	150		21RI21228	TCM-150	N750-337-15k		
C10	6.8		21RI20581				
C11	3.3		21RI15951	TCZ-3R3	NPOA-3R3	Z7-5533	
C12	470		21RI14554	DS-471	GP2K-471	UC-5347	
C13	330		21RI41015	DD-331	811-331	UC-5332	
C14	10000		21R483736	DD-103	811-01	DC-511	
C15A	800		21R400483	DD2-102	813-001	DCD-521	
B	600						
C16	3		21RI15951	TCZ-3R3	NPOA-3R0	Z7-553	
C17	5.2		21RI13084				
C18	1000		21RI20972	MFT-1000			
C19	5-3		21K70945	S26-3	315-01-0R5	CT585A	
C20	1500		21RI20100	DD-152	801-001	DC-5215	
C21	1500		21RI20100	DD-152	801-001S	DC-5215	
C22A	1500		21RI41408	DD2-152	813-001	DCD-5215	
B	1500						
C23	10		21RI21114	DD-100	831-100	UC-541	
C24	1		21RI14071	TCZ-1	NPOA-050		
C25	5-3		21K70943	S26-3	315-01-0R5	CT585A	
C26	12		21RI41633				
C27	2.2			TCZ-2R2	NPOA-2R2		
C28	1500		21RI20100	DD-152	801-001S	DC-5215	
C29	10000		21R483736	DD-103	811-01	DC-511	
C30A	800		21R400943	DD2-103	813-001	DCD-531	
B	800						
C31	1000		21RI15366	DD-103	801-001	DC-531	
C32	470		21RI15356	DD-471	831-471	UC-5347	
C33	10000		21R483736	DD-103	811-01	DC-511	
C34	1500		21RI20100	DD-152	801-001S	DC-5215	
C35	1500		21RI20100	DD-152	801-001S	DC-5215	
C36	1500		21RI20100	DD-152	801-001S	DC-5215	
C37	100		21R410936	TCM-101	N750L-101		
C38	470		21RI41631	DD-471	831-471	UC-5347	
C39	560		21RI20936	DD-561	811-561	UC-5356	
C40A	800		21R400943	DD2-103	813-001	DCD-531	Note 2
B	800						Note 3
C41	50		21RI14207	TCM-50	N750K-500		
C43	1000		21RI15388	DD-103	801-001	DC-531	
C43	560		21RI20936	DD-561	811-561	UC-5356	
C44	1500		21RI20100	DD-152	801-001S	DC-5215	
C45A	470		21RI21686	DD-471	831-471	UC-5347	Note 3
B	470			DD-471	831-471	UC-5347	Note 3
C46	39		21RI21468	TCM-39	N750K-390		
C47	1000		21R41027	DD-103	801-001	DC-531	
C48	22		21RI20539				
C49	22		21RI20539				
C50	470		21RI21797	DD-471	831-471	UC-5347	
C51A	470		21RI23868	DD-471	831-471	UC-5347	
B	470			DD-471	831-471	UC-5347	
C52	.1	200	21RI21573	DF-104		PT401	
C53	5000		21RI15313	DD-502	811-005	DC-525	
C54	1000		21RI15366	DD-103	801-001	DC-531	
C55	30		21R410048				Note 9
C56	.1	200	21RI21573	DF-104		PT401	
C57	1000		21RI15366	DD-103	811-01	DC-511	Notes 4 & 5
C58	18						
C59A	4700		21RI21489	DD2-502	811-0047	DC-525	Note 8
B	4700				811-0047	DC-525	Note 8

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: MOTOROLA PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C60	5000		21RI15313	DD-502	811-005	DC-525	
C61	5000		21RI15313	DD-502	811-005	DC-525	Note 7
C62	5000		21RI15313	DD-502	811-005	DC-525	
C63	470		21RI14554	DD-471	831-471	UC-5347	
C64	1000		21AI21878	DD-102	801-001	DC-531	
C65	.005	100	21RI15313	D6-502	GP3-333-103	PT625	
C66	3300		21RI20423	D6-332	811-0033	UC-5333	
C67	5000		21RI15313	DD-502	811-005	DC-525	
C68	5000	3000	21RI20095				
C69	.01	400	23RI21002	D6-103	GP3-333-103	PT411	
C70	.01	600	23RI23079	DF-103	811-01	PT613	
C71	10000		21R482726	DD-103	811-01	DC-511	
C72	4700		21RI20149	DD-472	811-0047	DC-535	
C73	4700		21RI15905	D6-332	GP3K-332	UC-5332	
C74	.05	400	23RI21567	DF-503		PT415	
C75	.0047	400	23RI14634	D6-472	GP3-333-472	PT6247	
C76	.0047	400	23K734834	D6-472	GP3-333-472	PT6247	
C77	.01	600	23K734633	D6-103	GP3-333-103	PT611	
C78	4700		21RI20149	DD-472	811-0047	DC-535	
C79	.05	400	23K490232	DF-503		PT415	
C80	.05	400	23K490232	DF-503		PT415	
C81	.05	200	23RI21185	DF-503		PT615	Note 5
C82	.05	200	23RI21005	DF-503		PT415	Note 5
C83	5000	3000	21RI20095				
C84	470		21RI14554	DD-471	831-471	UC-5347	
C85	1000		21RI18749	D6-102	GP21-102	DC-521	
C86	.003	600	23RI21569	D6-302	GP3-333-302	PT623	
C87	.001	1000	23K490268	DD-102	1RSKV-102	PT1621	
C88	100		21RI21898	DD-101	801-001	DC-531	
C89	.01	400	23RI21002	D6-103	GP3 333-103	PT411	
C90	100		21RI15090	D6-101	811-01	UC-531	
C91	.0047	400	23K734634	D6-472	GP3-333-472	PT6247	
C92	390		21RI23757	D6-391	811-3K	MCB243	
C93	390		21RI23757	D6-391	811-3K	MCB243	
C94	5000		21RI15312	DD-502	811-005	DC-525	
C95	.1	400		DF-104		PT401	Note 7
C96	5000	3000	21RI20095				
C97	220	2000	21RI22207	DD30-221	3KV-221	DC30322	
C98	220	2000	21RI22207	DD30-221	3KV-221	DC30322	
C99	72	2000	21RI21838				Note 6
C100	1500		21RI15100	DD-152	811-0015	DC-5215	Note 6
C101	5000		21RI15312	DD-502	811-005	DC-525	Note 10
C102	10000			DD-103	811-01	DC-511	Note 5

Note 2. C40 is a dual 470MMF unit in some versions. (Part No. 21RI21686)
Note 3. In some versions C45B is not used.
Note 4. Some versions use 5000MMF in this application. (Part No. 21RI15312)
Note 5. Not used in some versions.
Note 6. Some versions use 65MMF (Part No. 21RI21998) or 82MMF (Part No. 21RI20150) in this application.
Note 7. Not used previously to code -03.
Note 8. Chassis coded -04 use 10000MMF in this application.(Part No. 21R482726)
Note 9. Chassis coded -05 use 27MMF in this application. (Part No. 21RI18996)
Note 10. Used in chassis coded -06.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: MOTOROLA PART No	CENTRALAB PART No	CLAROSTAT PART No.	IRC PART No	MALLORY PART No	INSTALLATION NOTES
R1A	1500Ω	½	18BT30149	F1-7	RTV-461	QJ-510*	UE1998	Contrast (Panel)
B	1MEG	½		R3-59				Volume (Rear) Tap at 300KΩ
C	Switch			R3-1				Attach to R1B.
R2A	5Meg	½	18BT34142	AB-5T	A47-5Meg-S	QU-141	U-5T	Brightness
B	5Meg	½	Not Req.	AK-4	R3S-3	Not Req.	Not Req.	Attach to R2A.
R3A	100KΩ	½	18BT34145	AB-4D	A47-100K-S	QU-128	U-4D	Horizontal Hold
B	Shaft		Not Req.	AK-4	R3S-3	Not Req.	Not Req.	Attach to R3A.
R4A	850KΩ	½	18BT34143	AB-5W	A47-500K-ST	QU-1337	U-50T	Vertical Hold-Stop at 500KΩ
B	Shaft		Not Req.	AK-4	R3S-3	Not Req.	Not Req.	Attach to R4A.
R5A	750Ω	½	18BT33414	AB-1E	A47-750-S	QU-105	TAPTILL	Vertical Linearity
B	Shaft		Not Req.	AK-19	RN-3	TQ	Not Req.	Attach to R5A.
R6A	5Meg	½	18BT33413	AB-5T*	A47-5Meg-S*	QU-141*	SU-69*	Vertical Size-Stop at 5Meg.
B	Shaft		Not Req.	AK-19	RN-3	TQ	Not Req.	Attach to R6A.

*CONCENTRIKIT EQUIVALENT; K-4 KIT, BASE ELEMENTS AND SHAFTS; B17-109, P10-309 (Panel)
B13-117X, B13-33X (Rear)
76-1 SWITCH

†Connect a 330KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).
*Connect a 1Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R7	1Meg	½	6R6004	BT3-1Meg	
R8	1Meg	½	6R6004	BT3-1Meg	
R9	47KΩ	½	6R6056		
R10	22KΩ	½	6R6397		
R11	470Ω	½		BT5-470	
R12	10Ω	½	6R6321	BT5-10	
R13	3300Ω	½	6R6038	BT5-3300	
R14	470Ω	½	6R3949	BT5-470	
R15	10KΩ	½	6R6034		
R16	470Ω	½	6R6473		
R17	1000Ω	½	6R6301	BT5-1000	
R18	10KΩ	½	6R6054		
R19	470KΩ	½	6R6039	BT5-4700	
R20	220KΩ	½	6R6015		
R21	470Ω	½	6R3059	BT5-4700	
R22	10KΩ	½	6R6054		
R23	1000Ω	½	6R6301	BT5-1000	
R24	270Ω	½	6R5668	BTA-2700	
R25	1000Ω	½	6R6301	BT5-1000	Note 1
R26	10KΩ	½	6R6473		Note 2
R27	1000Ω	½	6R6301	BT5-1000	
R28	47Ω	½	6R5550	BT5-47	
R29	1000Ω	½	6R6301	BT5-1000	
R30	15KΩ	½			Note 3
R31	1000Ω	½	6R6301	BT5-1000	
R32	47Ω	½	6R5550	BT5-47	
R33	33KΩ	½	6R6410		
R34	1000Ω	½	6R6301	BT5-1000	
R35	1000Ω	½	6R6301	BT5-1000	
R36	120Ω	½	6R6551	BT5-120	

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R37	4700Ω	½	6R6080		
R38	180KΩ	½	6R6444		
R39	1Meg	½	6R6046		
R40	5600Ω	½	6R617		
R41	180KΩ	½	6R6444		
R42	18KΩ	1	6R5734		
R43	22KΩ	5	6R2058		
R44	330Ω	5	17K724045	PW7-3909	
R45	12KΩ	½	6R6394		
R46	2.2Meg	½	6R3927		
R47	100KΩ	½	6R6031		Note 4
R48	220KΩ	½	6R6407		Note 8
R49	220KΩ	½	6R6407		Note 8
R50	10KΩ	½	6R6320		Note 7
R51	1000Ω	½	6R617		Note 7
R52	2200Ω	½	6R6068	BT5-2200	
R53	220Ω	½	6R6270	BT5-220	
R54	150Ω	½	6R6373	BT5-150	
R55	220Ω	½	6R6270	BT5-220	Note 7
R56	220Ω	½	6R6270	BT5-220	
R57	33KΩ	½	6R6410	BT5-33K	
R58	22KΩ	½	6R6397	BT5-22K	
R59	68KΩ	½	6R6001	BT5-68K	
R60	180Ω	½		BT5-180	Note 8
R61	33KΩ 5%	½	6R5758	BTA-33K 5%	
R62	100Ω	½	6R6018	BT5-100	Note 9
R63	270KΩ	½	6R6414		
R64	5.3Meg	½	6R6491		
R65	1Meg	½	6R6046		
R66	1.5Meg	½	6R3968		

RESISTORS (cont)

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: MOTOROLA PART No	IRC PART No	NOTES
R67	560KΩ	½	6R5697		
R68	22KΩ	½	6R6397		
R69	68000Ω	½	6R6428		
R70	22000Ω	½	6R6059		
R71	22KΩ	½	6R6028		
R72	10KΩ	½	6R6054		
R73	100Ω	½	6R618		
R74	56000Ω	½	6R617		
R75	6200Ω	½	6KJ05179		
R76	5600Ω	½	6R6291		
R77	560Ω	½	6R6291		
R78	27000Ω	½	6R6571		
R79	22KΩ	½	6R6397		
R80	100KΩ	½	6R6031	BT5-100K	
R81	150Ω	1	6R40053		Note 10
R82	150KΩ	1	6R40053	BT5-100K	
R83	100KΩ	½	6R6031		
R84	100KΩ	½	6R6031	BT5-100K	
R85	4.7Meg	½	6R6123		
R86	56000Ω	½	6R617		
R87	22KΩ	½	6R6084		
R88	68KΩ	½	6R6074		
R89	4700Ω	½	6R6080	BT5-4700	
R90	10000Ω	½	6R6224	BT5-1000	
R91	68000Ω	½	6R6080	BTB-6800	Note 11
R92	47KΩ	½	6R3088		Note 8
R93	5600Ω	½	6R6291		Note 9
R94	18Ω	½	6R6021		
R95	5600Ω	½	6KA04492		
R96	3.3Ω	1	17K485442	BW1-3.3	
R97	130Ω	10	17K713058	1 2/4A-135	
R98	115 Hot	7	6A725842		
	130Ω Cold				
R99	1.5Ω	5	17A711500		

Note 1. Used in chassis coded TS-809A-0 and TS-809A-1.
Note 2. A 22KΩ ½W resistor is used in chassis coded TS-809-00.
Note 3. A 47KΩ ½W resistor is used in chassis coded TS-809-00.
Note 4. A 470KΩ ½W resistor is used in chassis TS-809A-00, TS-809A-01, TS-809A-02.
Note 5. A 100KΩ ½W resistor is used in chassis coded TS-809A-00 TS-809A-01, TS-809A-02.
Note 6 Used in chassis coded TS-809A-00, TS-809A-01, TS-809A-02.
Note 7. Not used in some versions.
Note 8. A 15000 ½W 5% resistor is used in chassis coded TS-809A-00 TS-809A-01, TS-809A-02.
Note 9. Not used in chassis coded TS-809A-00, TS-809A-01, TS-809A-02
Note 10. Used in chassis TS-809A-00.
Note 11. A 47000Ω ½W resistor is used in chassis coded TS-809A-00, TS-809A-01, TS-809A-02.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	Vert. Osc. Trans.	25ST30179	A-97X	A-3006		Y406	A-8125	26A03	A-97X
T3	Horiz. Output Trans.	24K733568		SVO-39*		XU8 *	A-8346 *	FLY-74 *	
	Primary Winding	24K733567							
	Secondary Winding	24K731990							
T3	Vert. Output Trans.	25ST35740	Z1804	A-3037	2227I	V313	A-8123	26S52	A-102X
		25K721027 ①							
T4A	Yoke(90°) Horiz. (24MH)	24D735859②		MDF-92			DY-16A ③ ⑤	Y-16 ③	
B	Vert. (37.5MH)	24C7334L ①		③ ⑤			⑤		
		24K733710 ①							

① Alternate Motorola part number.
② Includes plug, less rear cover and centering device.
③ Use original yoke rear cover and centering device.
④ Use original horizontal damping network.
⑤ Remove damping network from terminals #1 and #2. Connect horizontal damping capacitor to terminals #3 and #7
Use original horizontal damping network, if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6	4	6	6	6	6	6	
4	3	5	4	5	5	4	
3	2	4	3	4	4	5	
1	1	1	1	1	1	1	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI	SEC	REPLACEMENT DATA: MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	2.4kΩ	3.2Ω	25K730140	Z2001	A-2928	A-3876	24S50	S-1X	

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V C IMP	REPLACEMENT DATA: MOTOROLA PART No	QUAM PART No	NOTES
SP1	6"	8Ω	3.2Ω	50K735966	6E87S	

COILS (RF-IF)

ITEM No.	USE	DC RES: PRI.	SEC.	REPLACEMENT DATA: MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	VHF Ant. Trap	OHCT		24B735908				
L2	IF Trap	0Ω		24A735655				
L3	UHF IF Coil	0Ω		24A735121				
L4	VHF Ant. Coils	0Ω		24K735857				Channels 2 thru 6
L5	VHF Ant. Shunt Coil	0Ω		24B735859				Channel 5
L6	VHF Ant. Coils	0Ω		24K734303				Channels 7 thru 12
L7	VHF Ant. Shunt Coils	0Ω						High Channels
L8	VHF Ant. Coil	0Ω		24A735860				Channel 13
L9	FIL. Choke	0Ω		24K730391				
L10	Neut. Coil	0Ω		24B731256				
L11	VHF RF Coil	0Ω		24A735856				Channel 13
L12	VHF RF Coils	0Ω		24B735758				Channels 2 thru 6
L13	VHF RF Coils	0Ω						Channels 7 thru 12
L14	UHF IF Coil	0Ω						Part of L13
L15	RF Choke	0Ω		24A732852				
L16	RF Choke	0Ω		24A732852				
L17	FIL. Choke	0Ω		24K730391				
L18	VHF Osc. Coil	0Ω		24A735759				Channel 13
L19	VHF Osc. Coils	0Ω		24B735859				
L20	Conv. Plate	0Ω		24K734303				
L21	1st Video IF	.1Ω		24K733875	17-4522*	TV-131	6326*	
L22	FIL. Choke	0Ω		24K730391		19-1001	TV-189	6804	L 3 Microhenries
L23	2nd Video IF	.1Ω	.1Ω	24B735179	19-1000		6231		Includes 4i 25MC Trap
L24	FIL. Choke	0Ω		24K730391		TV-189	6804		L 3 Microhenries

3924 MEADE ST. DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L25	3rd Video IF	.1Ω	.1Ω	24B735180			6222	Includes 47.25MC Trap
L26	RF Choke	0Ω		24A732652	19-1001		4604	1.35 Microhenries
L27	Series Peaking Coil	1.5Ω			19-1005		4612	10 Microhenries-Not used in some versions
L28	Series Peaking Coil	7Ω		24K732807	19-4200	TV-184▲	6154▲	200 Microhenries-Wound on 10KΩ resistor.
L29	Shunt Peaking Coil	9Ω		24K732809	19-3250	TV-185	6130	272 Microhenries
L30	Series Peaking Coil	2.1Ω		24R121728	19-1005♦		4612♦	13 Microhenries-Wound on 8.2KΩ resistor
L31	4.5MC Trap	2.3Ω		1V730808	20-1004	TV-151	1469	
L32	Series Peaking Coil	8Ω		24K732808	19-3250▲	TV-185▲	6181▲	234 Microhenries-Wound on 10KΩ resistor
L33	Shunt Peaking Coil	6.8Ω		24K732806	19-3180	TV-184	6180	
L34	Shunt Peaking Coil	26Ω		24K734187	19-4950▬		6157▬	965 Microhenries-Wound on 1.2KΩ resistor
L35	RF Coil	0Ω		24A733225	19-1005		4612	
L36	RF Coil	10.5Ω		24K735172	19-4400			400 Microhenries
L37	Sound IF	4.6Ω		24K735083	20-1005	TV-151	1470	
L38	Fil. Choke	0Ω		24K730391	19-1001	TV-189	4604	1.3 Microhenries
L39	Ratio Det.	7.5Ω	1.5ΩCT	24K735697	17-3497	TV-115	6205	Tertiary Winding=.8Ω
L40	Horiz. Osc.	40Ω		1V732556	19-1576†	TV-163†	6210†	
L41	RF Choke	8Ω		24B735532	19-3300	TV-190	6132	332 Microhenries
L42	RF Choke	1.8Ω		24A733225	19-1005		4612	10.5 Microhenries
L43	RF Choke	1.8Ω		24A733225	19-1005		4612	
L44	Linearity Coil	16Ω		24A731609			6304#	5.6 Millihenries, Wound on .068MFD Cap.

* Use one winding only.
▬ Detune trap.
▲ Parallel with 10KΩ resistor.
♦ Parallel with 8.2KΩ resistor.
▬ Parallel with 1.2KΩ resistor.
† Drill new mounting hole.
# Parallel with .068MFD Cap.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.220ADC	48K720023 48B720023 ①	1090	MR-300	6S300	6Q4	300	① Alternate Selenium Rectifier
M2	.220ADC	48K720023 48B720023 ①	1090	MR-300	6S300	6Q4	300	

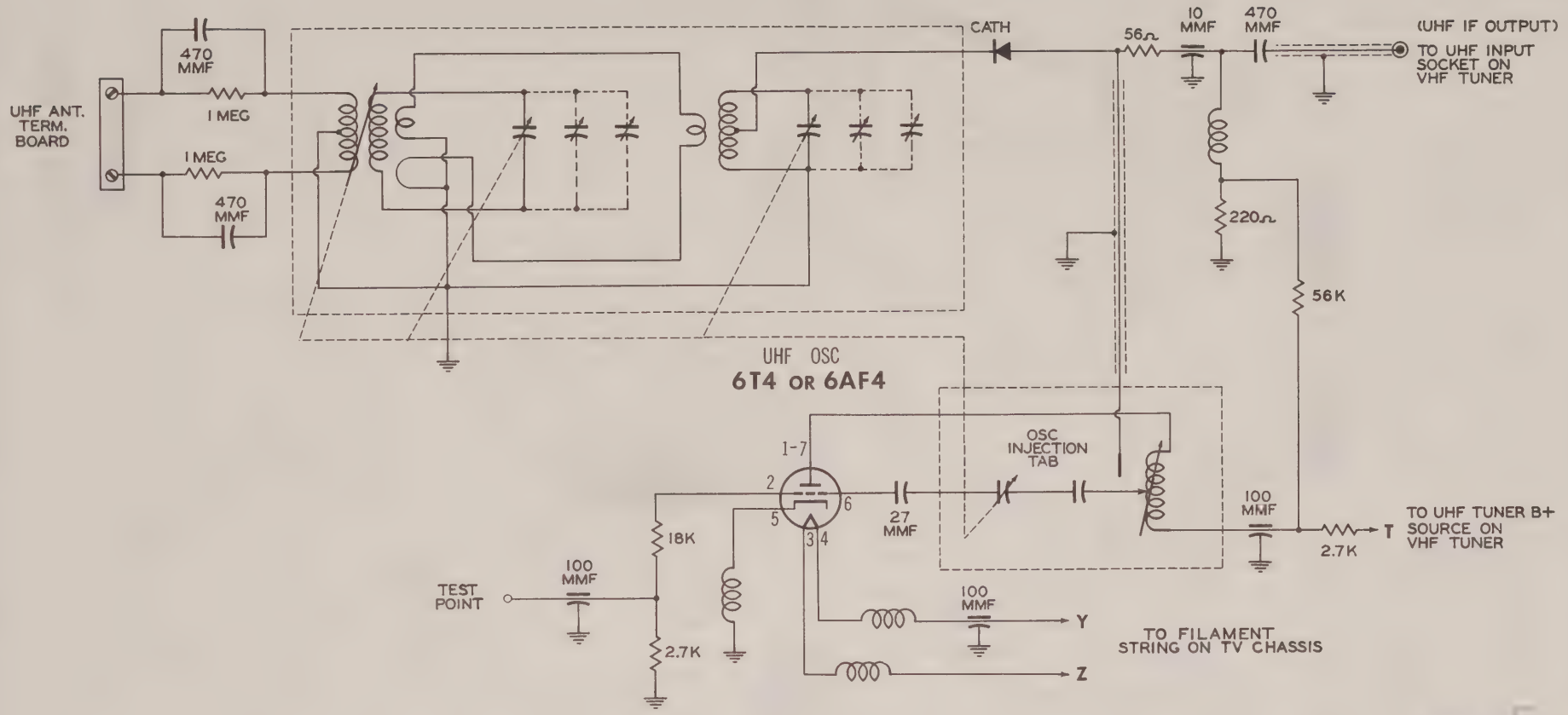
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		MOTOROLA PART No.	SYLVANIA PART No.	
M3		48K733204 *	1N60	Video Detector

* Alternate part numbers 48C711052, 48K711077, 48K722720, 48K733158, 48K712199.

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M4	Tuner	1U735114	VHF - Chassis TS-609
	Tuner	1U735118	VHF - Chassis TS-609Y
	Tuner	TT-72A	VHF - used in chassis coded TS-609A-07
M5	Tuner	VTT-37	UHF - Chassis TS-609Y
M6	Video Det. Assy.	24C735329	Includes M3, coils and capacitor
M7	Switch		Area selector switch (Rotary - wafer type)
M8	Centering Device	48A721145	Includes deflection yoke (T4) rear cover
M9	Ion Trap	59A732262	
	Cabinet	16E735280	Models 24T2, Y24T2
	Cabinet	16K735281	Models 24T2B, Y24T2B
	Knob	36K735381	VHF channel selector - Models 24T2, 24T2B
	Knob	36C735380	VHF channel selector - Models Y24T2, Y24T2B
	Knob	36C735378	Contrast
	Knob	36C735384	Fine tuning and on-off-volume
	Knob	36B712294	Area selector switch
	Knob	36B733492	Horiz. hold, vert. hold and brightness
	Scale	34C735386	UHF channel selector - Models Y24T2, Y24T2B
	Mask	13D735047	Metal
	Mask	13E734209	Plastic
	Safety Glass	61K735295	



UHF TUNER PART NO. TT37 USED WITH CHASSIS TS609Y

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UHF TUNER SCHEMATIC

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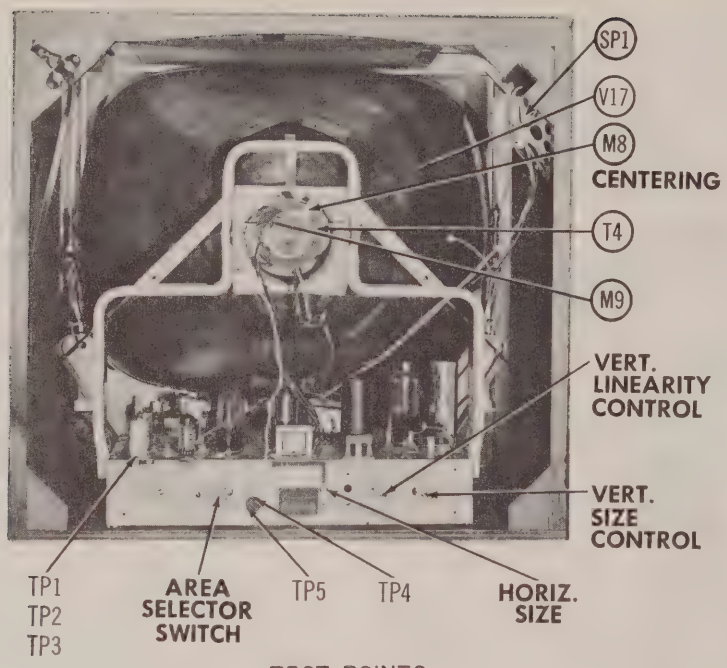


TEST POINTS

(1) PIN 1 (-1.3V.) AGC
(2) PIN 3 (-.4V.) VIDEO DET. OUTPUT (A)
(3) PIN 5 (250V.) B+
(4) (200V.) HORIZ. OSC. B+
(5) (-.6V.) HORIZ. AFC

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Normally the horizontal hold control will have a sync range of approximately 50 degrees. If the control is too critical, adjust as follows:

1. Set the area selector switch to "Local" position and all other controls for a normal picture.

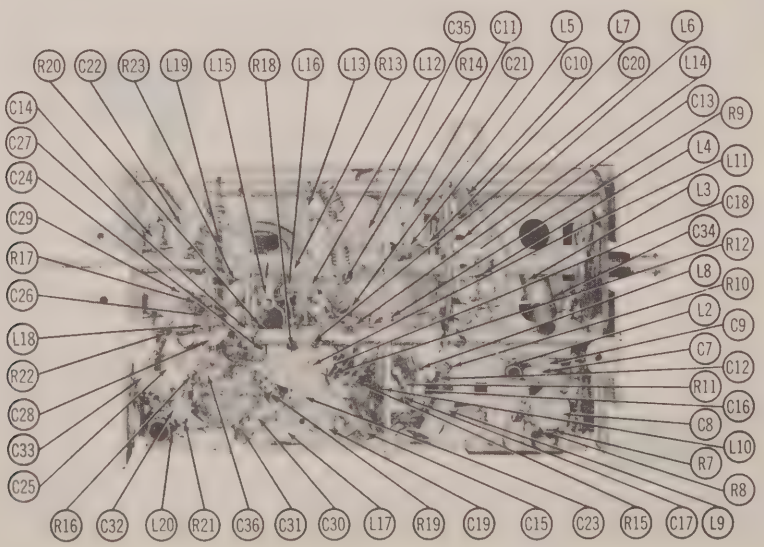
2. Short out the AFC voltage. Shunt the horizontal oscillator coil (L40) to ground with a .1MFD/400V capacitor. This may be done with the chassis in cabinet by using the three pin socket on rear of chassis labeled "Test Receptable Only".

3. Adjust the horizontal hold control to the point where picture remains near stationary sync horizontally.

4. Remove .1MFD/400V capacitor from L40 and adjust the horizontal oscillator slug (B1) to the point where picture remains near stationary sync horizontally.

5. Remove short from AFC voltage and adjust the horizontal hold control until picture remains in sync over approximately 30 degrees of its range, while switching off channel and back again.

Adjust the horizontal size control for a picture slightly wider than necessary to fill the picture mask horizontally.



RF TUNER BOTTOM VIEW

PROPERTY OF
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DENVER, COLORADO

NEWCOMB
MODEL D-12

TRADE NAME	Newcomb Model D-12
MANUFACTURER	Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood, Calif.
TYPE SET	AC Operated 12 Watt Audio Amplifier
TUBES (Five)	Types: 12AX7 Preamp.-AF Amp., 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.61 Amp. @ 117 Volts AC.

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PARTS LIST AND DESCRIPTIONS

NEWCOMB
Model D-12

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NEWCOMB PART No.	STANDARD REPLACEMENT		
V1	Preamp. - AF Amp.	12AX7	12AX7	9A	
V2	AF Amp. - Phase Inv.	12AX7	12AX7	9A	
V3	Audio Output	6V6GT	6V6GT	7AC	
V4	Audio Output	6V6GT	6V6GT	7AC	
V5	Rect.	5Y3GT	5Y3GT	5T	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	NEWCOMB PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▬40	475	CE-36	FP396.2	TM-401010-500	Q-075	
B	■10	475		TC36	TD-25-50		
C	▲10	475					
D	25	50					
C2	4	450	CE-1	TC70	TD-4-450	FM-4504	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

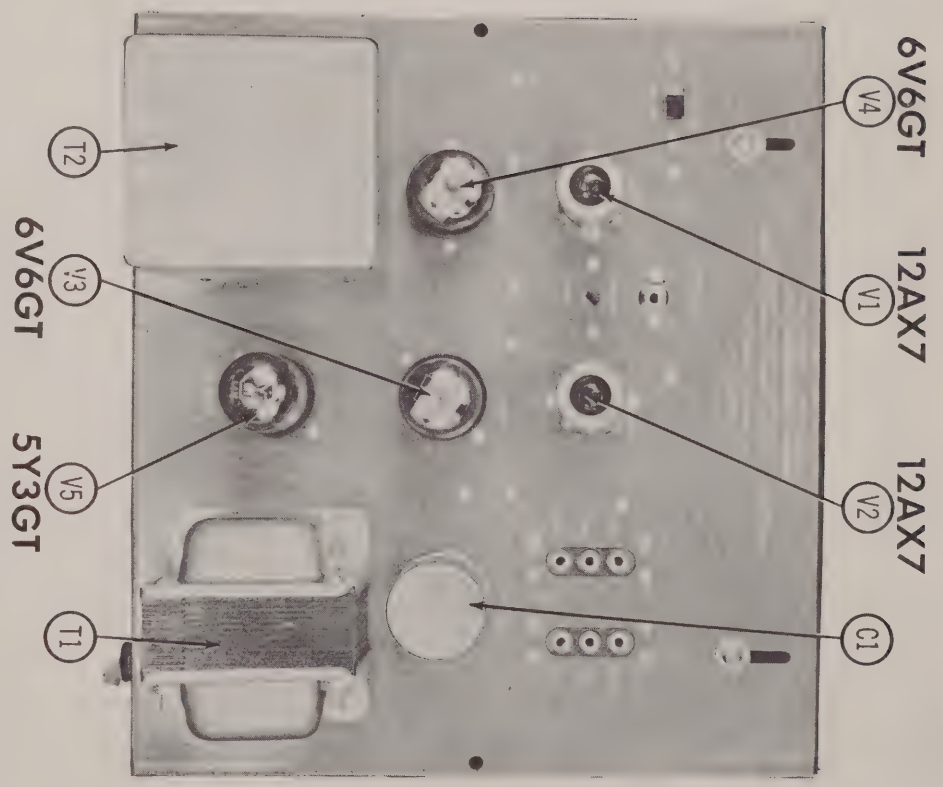
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	NEWCOMB PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	.022	600		DF-203	817-02	PT6122	
C4	.01	600	CP-45	D6-103	GP3-333-103	PT611	
C5	1500		CM-27	D6-152	GP2L-152	UC-5215	
C6	47		CM-3	D6-470	GP1K-470	UC-5447	
C7	100		CM-34	D6-101	GP1K-101	UC-531	
C8	150		CM-23	D6-151	GP2K-151	UC-5315	
C9	250		CM-22	D6-251	GP2K-251	UC-5325	
C10	1000		CM-38	D6-102	GP2L-102	UC-521	
C11	.1	400	CP-51	DF-104		PT401	
C12	20000		CM-35	DF-203	817-02	PT612	
C13	20000		CM-35	DF-203	817-02	PT612	
C14	15		CM-1	D6-150	GP1K-150	UC-5415	
C15	1500		CM-27	D6-152	GP2L-152	UC-5215	
C16	1500		CM-27	D6-152	GP2L-152	UC-5215	
C17	10000		CM-32	DD-103	811-01	DC-511	
C18	470		CM-25	D6-471	GP2K-471	UC-5347	
C19	10000		CM-32	DD-103	811-01	DC-511	
C20	10000		CM-32	DD-103	811-01	DC-511	
C21	100		CM-34	D6-101	GP1K-101	UC-531	
C22	20000		CM-35	DF-203	817-02	PT612	
C23	20000		CM-35	DF-203	817-02	PT612	
C24	10		CM-37	D6-100	GP1K-100	UC-541	Note 1.
C25	.047	600	CP-49	DF-503		PT6147	
C26	.047	600	CP-49	DF-503		PT6147	
C27	.047	600	CP-49	DF-503		PT6147	

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NEWCOMB PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	5Meg	1/2	RV-57K					Bass
B	5Meg	1/2						
R2A	2Meg	1/2	RV-59K		A47F3-2Meg	Q19-139X	UT-451	Treble (Tap at 1.2Meg)
B	Shaft		Not Req.		KSS-3	Not Req.	Not Req.	Attach to R2A.
R3A	1Meg	1/2	RV-63K	ABT-73	A47F4-1Meg	Q13-137X	UT-438	Loudness (Tap at 300KΩ)
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R3A.
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R3A.
R4	100Ω	2	RV-75					Hum (Wirewound)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R5	560KΩ	½	RR-34	BTS-560K	
R6	560KΩ	½	RR-34	BTS-560K	
R7	100KΩ	½	RR-27	BTS-100K	
R8	56KΩ	½	RR-25	BTS-56K	
R9	56KΩ	½	RR-25	BTS-56K	
R10	33KΩ	½	RR-23	BTS-33K	
R11	100KΩ	½	RR-27	BTS-100K	
R12	22KΩ	½	RR-21	BTS-22K	
R13	18Meg	½	RR-140	BTS-18Meg	
R14	270KΩ	½	RR-31	BTS-270K	
R15	560KΩ	½	RR-34	BTS-560K	
R16	560KΩ	½	RR-34	BTS-560K	
R17	470KΩ	½	RR-33	BTS-470K	
R18	270KΩ	½	RR-31	BTS-270K	
R19	1.5Meg	½	RR-39	BTS-1.5Meg	
R20	820KΩ	½	RR-36	BTS-820K	
R21	470KΩ	½	RR-33	BTS-470K	
R22	560KΩ	½	RR-34	BTS-560K	
R23	330KΩ	½	RR-32	BTS-330K	
R24	120KΩ	½	RR-28	BTS-120K	
R25	82KΩ	½	RR-133	BTS-82K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R26	560KΩ	½	RR-34	BTS-560K	
R27	470KΩ	½	RR-33	BTS-470K	
R28	18Meg	½	RR-140	BTS-18Meg	
R29	270KΩ	½	RR-31	BTS-470K	
R30	12KΩ	½	RR-19	BTS-12K	
R31	27KΩ	½	RR-22	BTS-27K	
R32	18Meg	½	RR-140	BTS-18Meg	
R33	560KΩ	½	RR-34	BTS-560K	
R34	100Ω	½	RR-1	BTS-100	
R35	560KΩ	½	RR-34	BTS-560K	
R36	100KΩ 5%	½	RR-50	BTS-100K 5%	
R37	12KΩ	½	RR-28	BTS-12K	
R38	100KΩ 5%	½	RR-50	BTS-100K 5%	
R39	12KΩ	½	RR-28	BTS-12K	
R40	560K	½	RR-34	BTS-560K	
R41	250Ω	5	RR-94	PW7-250	
R42	560KΩ	½	RR-34	BTS-560K	
R43	1200Ω	2	RR-146	BTB-1200	
R44	3900Ω	½	RR-13	BTS-3900	
R45	6.8Ω	1	RR-149		

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .61A	660VCT .088ADC	5VAC @ 2A	6.3VAC @ 1.7A	TR-166			PC-8409①	24R04U ②	

① Tape 6.3V center tap.
② Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7.3KΩ CT	16Ω Tap @ 8Ω	TR-178						

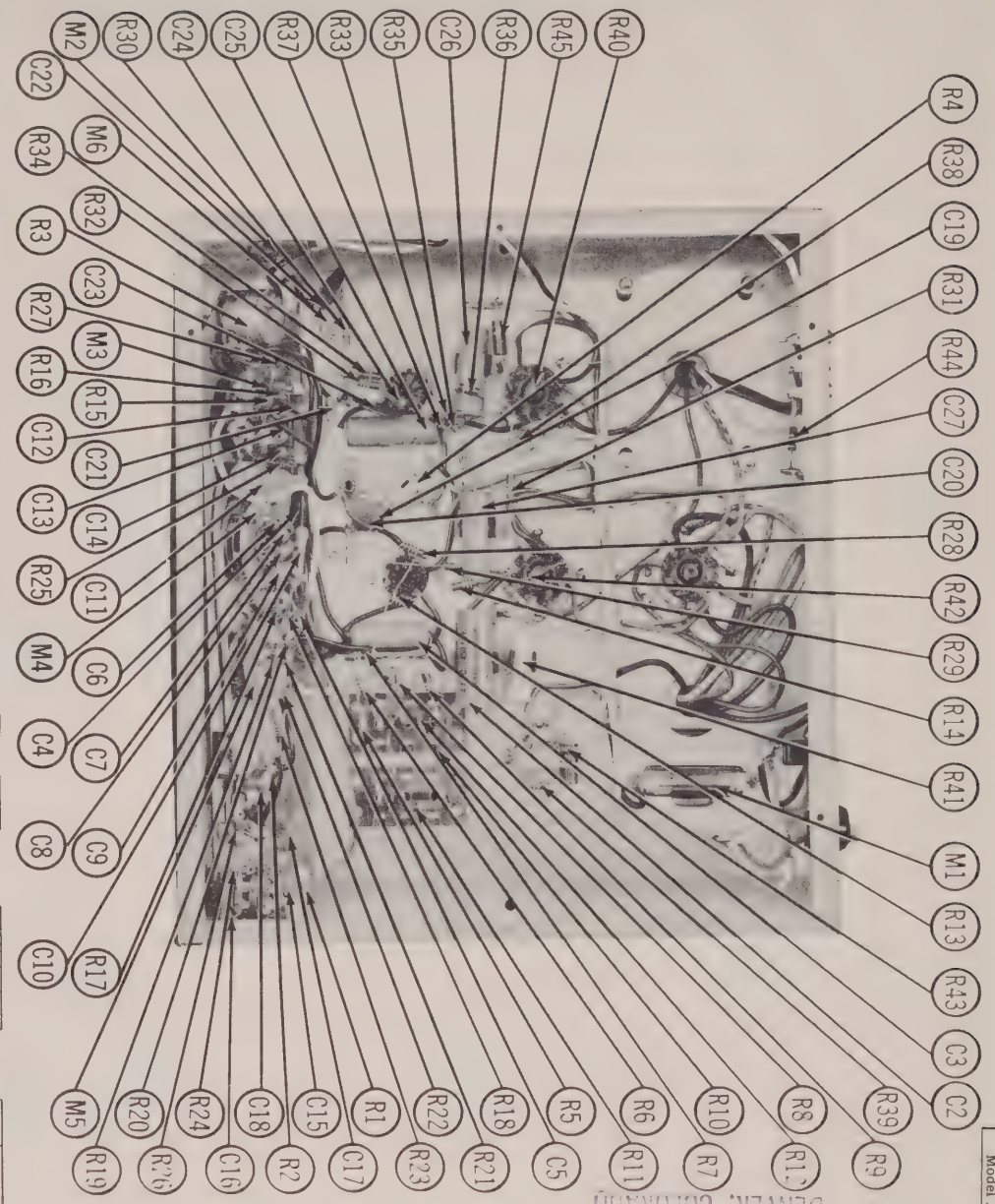
FUSES

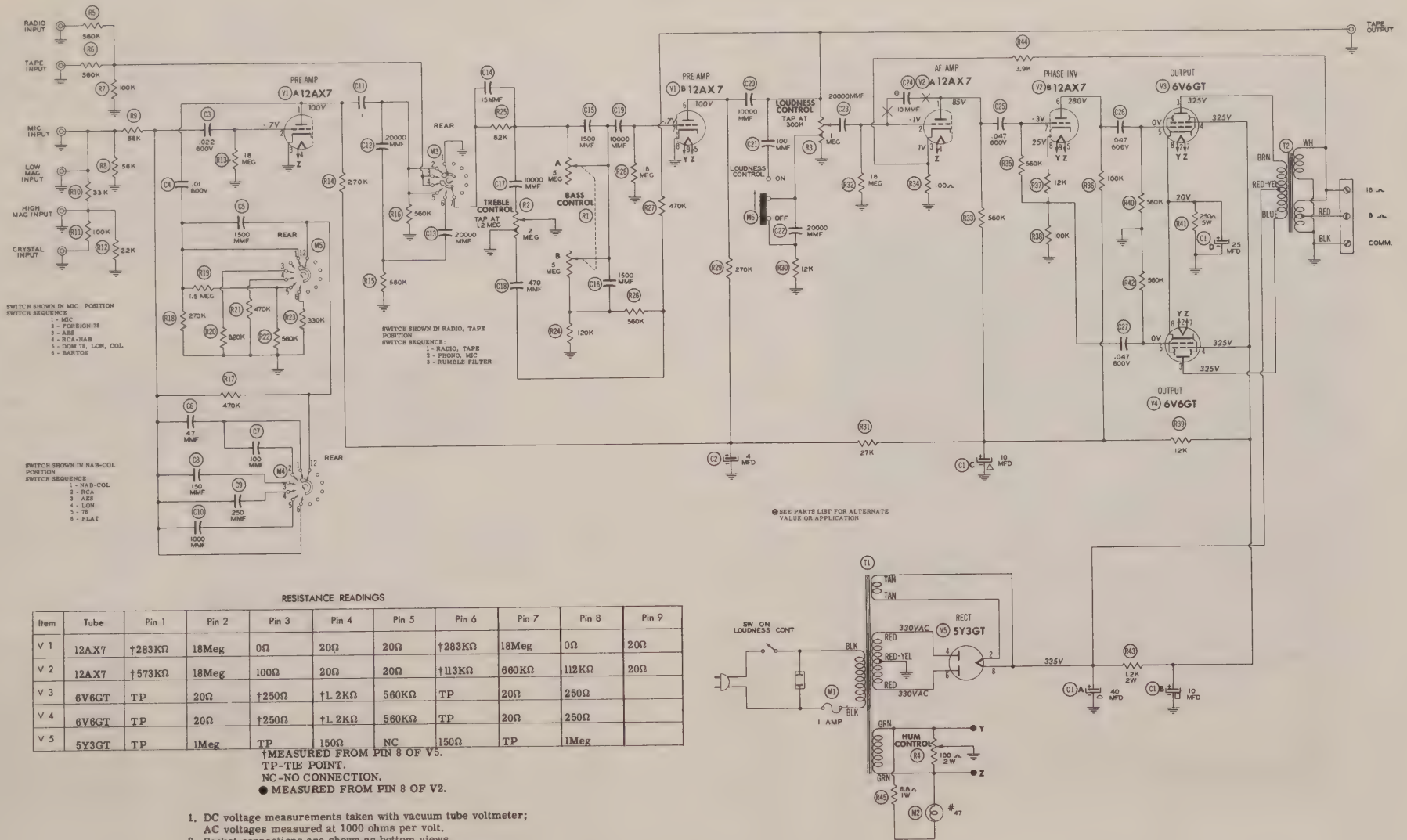
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			NEWCOMB PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1A 250V	FA-4		312001 (3AG1A)	357001	AGC1	4405

MISCELLANEOUS

ITEM No.	PART NAME	NEWCOMB PART No.	NOTES
M2	Pilot Light		#47
M3	Switch	SY-90	Selector (Rotary-Wafer Type)
M4	Switch	SY-89	Treble Record Compensation (Rotary-Wafer Type)
M5	Switch	SY-89	Bass Record Compensation (Rotary-Wafer Type)
M6	Switch	SY-5	Loudness (SPDT-Slide Type)

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†283KΩ	18Meg	0Ω	20Ω	20Ω	†283KΩ	18Meg	0Ω	20Ω
V 2	12AX7	†573KΩ	18Meg	100Ω	20Ω	20Ω	†113KΩ	660KΩ	112KΩ	20Ω
V 3	6V6GT	TP	20Ω	†250Ω	†1.2KΩ	560KΩ	TP	20Ω	250Ω	
V 4	6V6GT	TP	20Ω	†250Ω	†1.2KΩ	560KΩ	TP	20Ω	250Ω	
V 5	5Y3GT	TP	1Meg	TP	150Ω	NC	150Ω	TP	1Meg	

†MEASURED FROM PIN 8 OF V5.
TP-TIE POINT.
NC-NO CONNECTION.
● MEASURED FROM PIN 8 OF V2.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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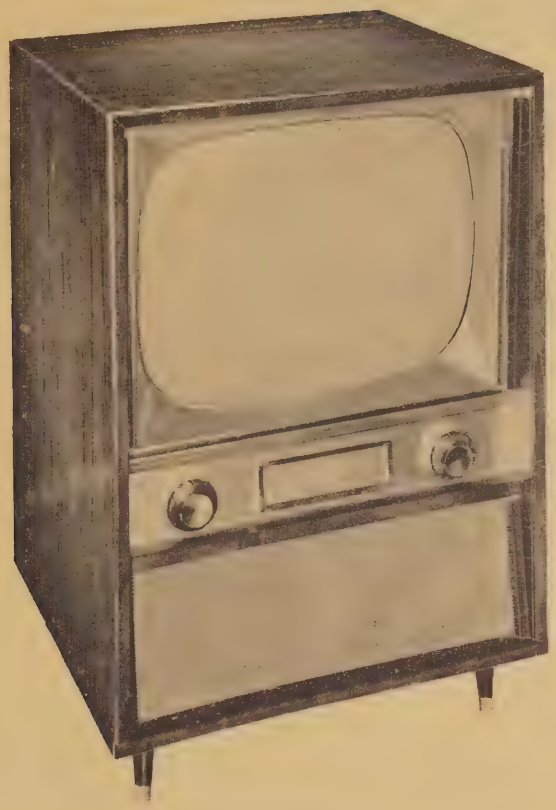

PACKARD-BELL MODEL 24203

TRADE NAME	Packard-Bell Models 24203, 24203U, 24205, 24205U (Ch. T20)
MANUFACTURER	Packard-Bell Co.-Service Div., 11th. & Hope Sts., Los Angeles 15, California
TYPE SET	Television Receiver
TUBES	Twenty-Five
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.8 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 18
Parts List and Descriptions ..... 11 thru 14
Photographs
Cabinet-Rear View 18
Capacitor Identification 3, 10
Chassis-Top View 14
RF Tuner 17
Resistor Identification 4, 9
Photographs (Cont)
Trans., Inductor & Alignment Identification 18
Resistance Measurements 8
Servicing in the Field 1
Schematic (Alternate Tuner) 15, 16
Schematic (TV) 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

PACKARD-BELL MODELS
24203, U, 24205, U (Ch. T20)

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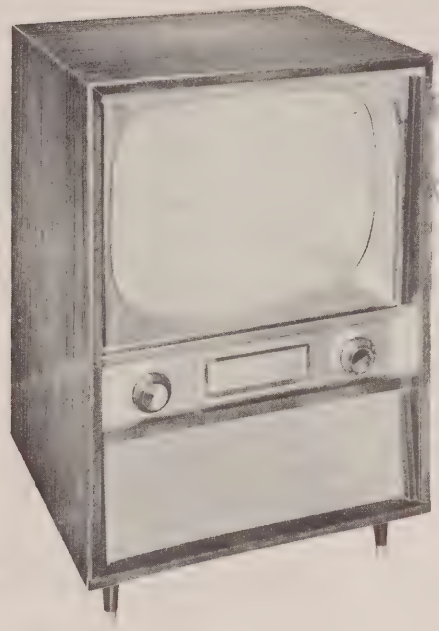

MODELS — CHASSIS
24203, 24203U,
24205, 24205U T20

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 7 wood screws. Remove rear cover.
3. Disconnect speaker plug.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 8 wood screws. Remove 2 speakers.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding metal molding located on the top edge of the safety glass. Remove molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

(See tube placement chart on page 5.)

SPECIAL ADJUSTMENTS

A. Automatic Noise Inverter Control Adjustment

The automatic noise inverter control (R3B) should be adjusted where the receiver is being used.
Tune in strongest local TV station locally. Adjust R3B fully counter clockwise, then clockwise until picture begins to distort. Adjust R3B counter clockwise until distortion just disappears. Check all available channel for stable sync.

B. AGC Control

The AGC control (R6B) should be adjusted with the strongest TV station available.
R6B is located on the front panel and is normally set at its maximum clockwise position.
If necessary, adjust R6B for best receiver sensitivity and least noise interference. When adjusting R6B, note screen so sync stability is not distorted.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the front of the chassis. Adjust the horizontal hold slug until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the radio detector secondary slug (A14) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal and vertical sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly located.

PACKARD-BELL MODELS
24203, U, 24205, U (Ch. T20)

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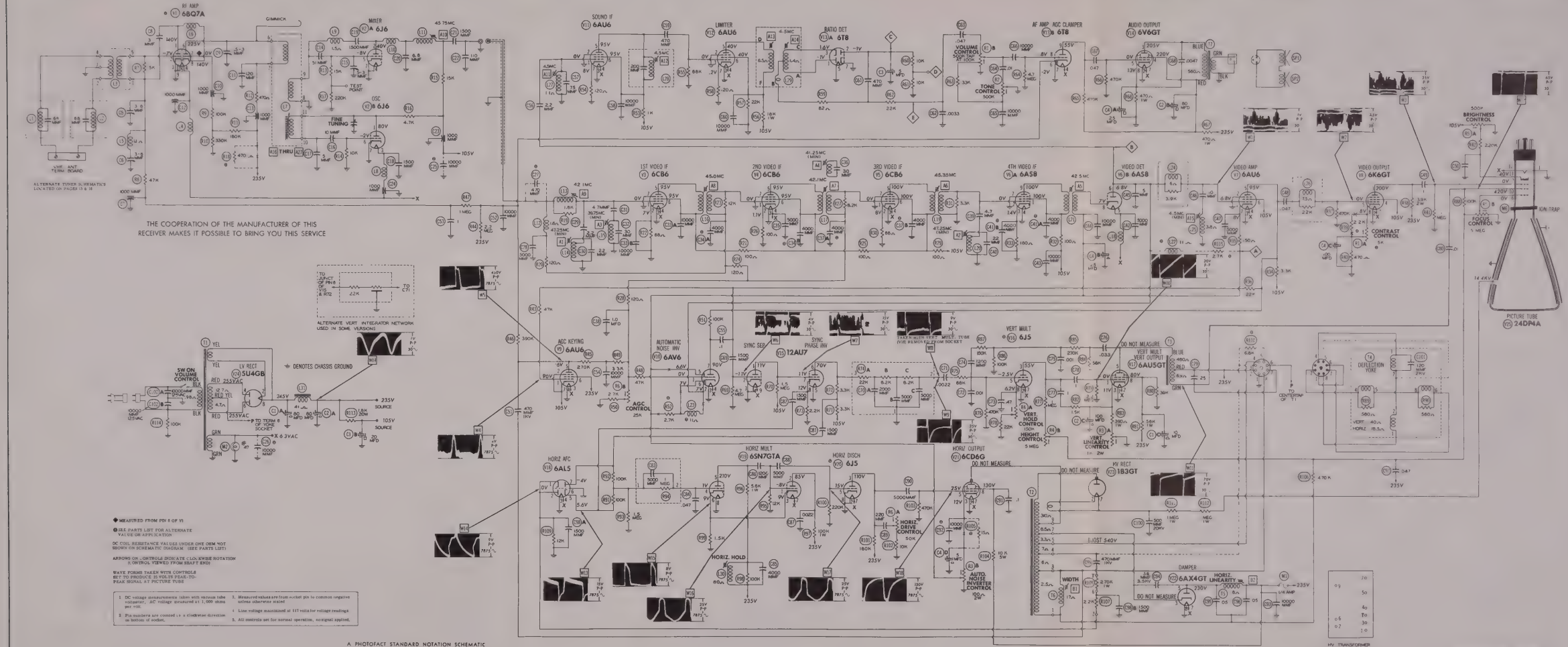

◆ MEASURED FROM PIN 5 OF V1

SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 35 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied.

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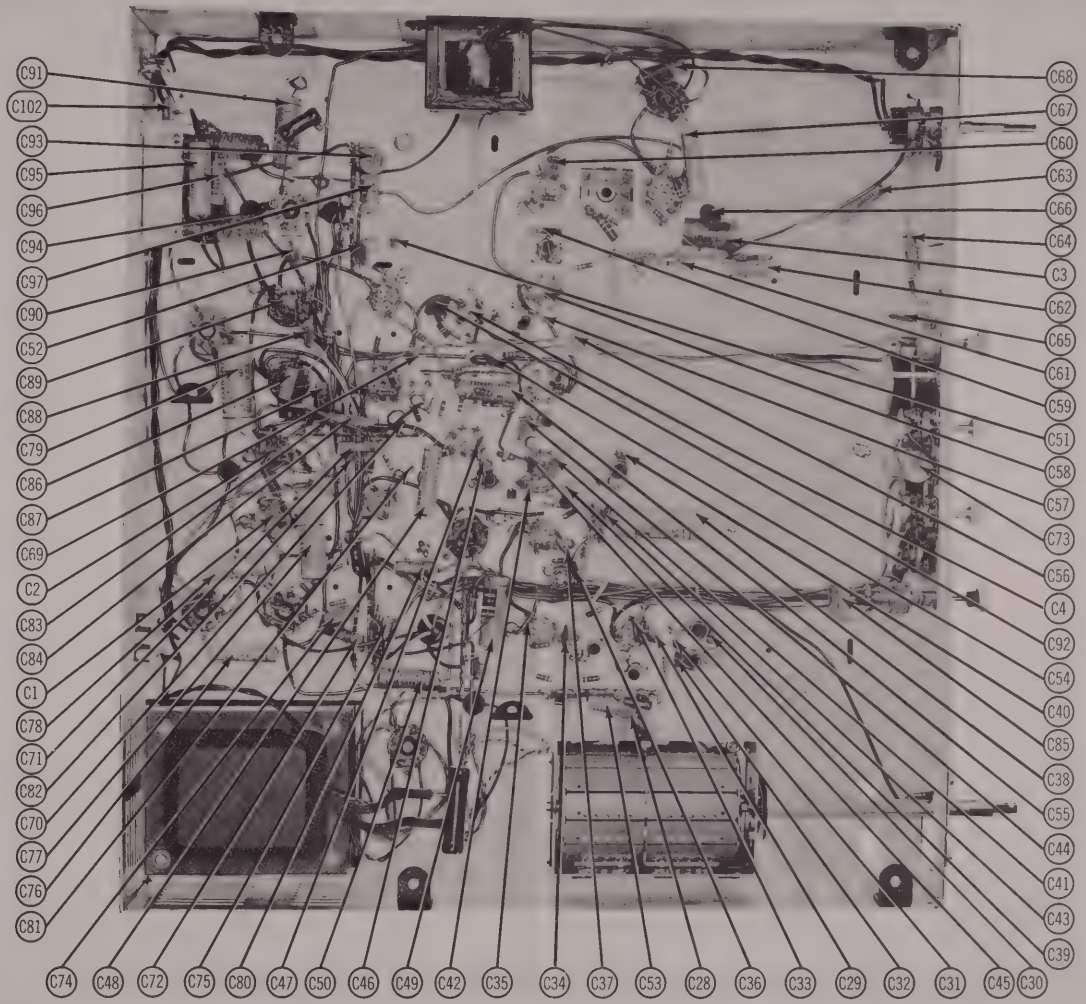
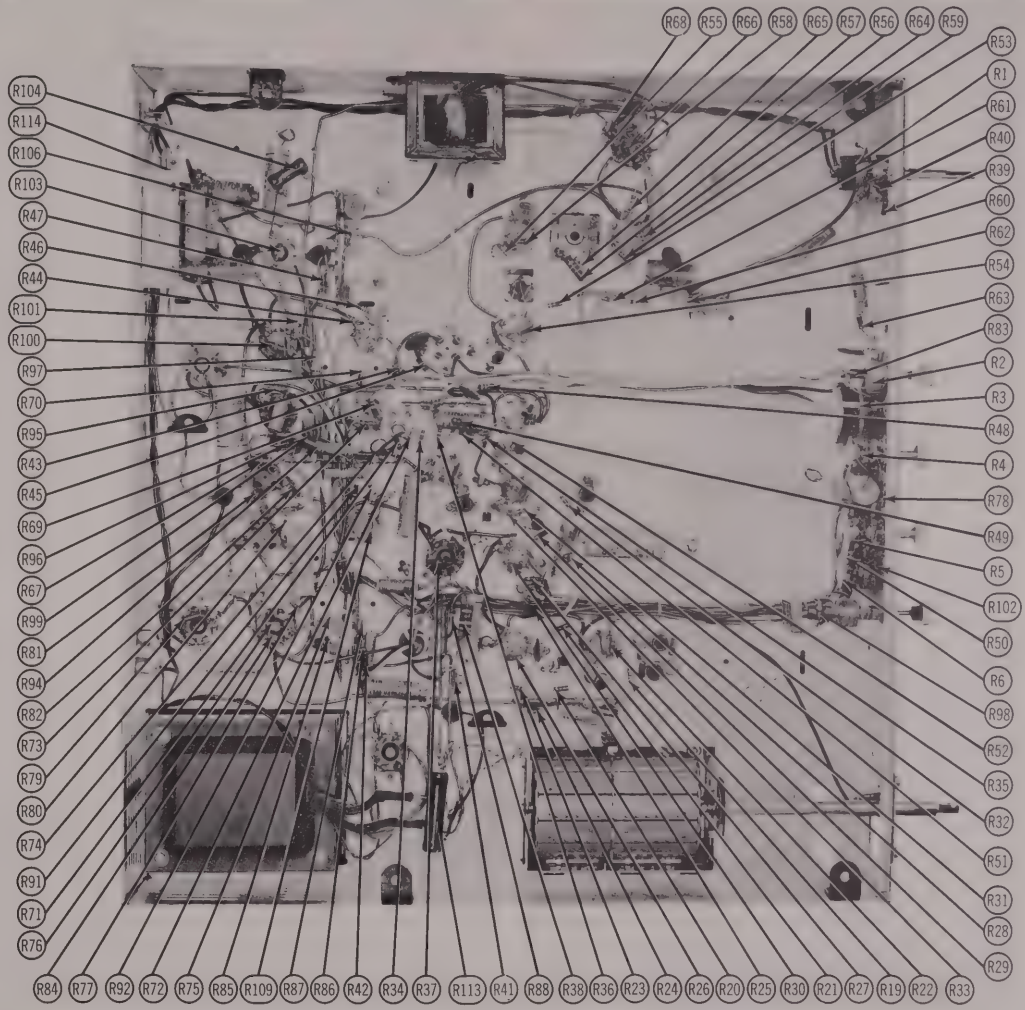
PACKARD-BELL MODELS
24203, U, 24205, U (Ch. T20)

PACKARD-BELL MODELS
24203, U, 24205, U (Ch. T20)



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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TUBE PLACEMENT CHART

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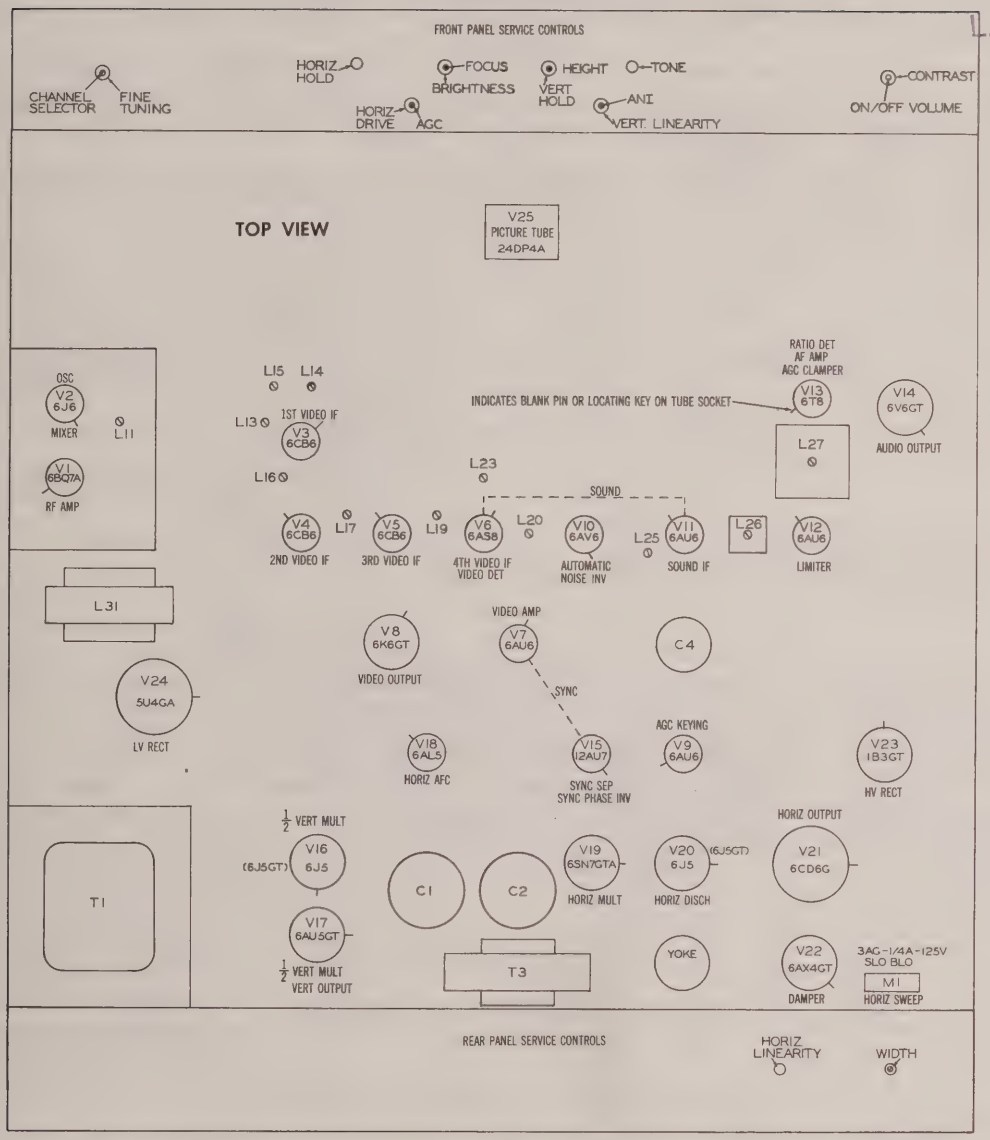

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V24**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V8, V9, V25**
Has pic, no sound - **V11, V12, V13, V14**
Overloaded picture - **V9, V13**

SYNC FAILURE
No vert. sync - **V15, V16, V17**
No horiz. sync - **V15, V18, V19**
No vert. or horiz. sync - **V15**

SWEEP FAILURE
No raster, has sound - **V19, V20, V21, V22, V23, V25, Fuse (M1)**
No vertical deflection - **V16, V17**
Poor vert. linearity or foldover - **V16, V17**
Poor horiz. linearity or foldover - **V19, V20, V21, V22**
Narrow picture - **V19, V20, V21, V22, V23, V24**
Vert. off freq. - **V15, V16, V17**
Horiz. off freq. - **V15, V18, V19**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal multivibrator tube (V19) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the 6AV6 (V10) from its socket. Connect the negative lead of a 3 volt battery to the ungrounded side of C38. Connect the positive lead to chassis.
In step 8 under "Signal Generator Coupling" the converter tube is a 6U8 on models which use VHF/UHF Tuners. Part numbers 10540A and 10535C.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side thru .001MFD to center pin of IF plug on top of tuner (remove plug from socket). Low side to cable shield.	47.25MC (Unmod.)	Any	DC probe to point (B). Common to point (A).	A1, A2	Use MAXIMUM output from signal generator. Adjust for MINIMUM deflection.
2.	"	"	39.75MC	"	"	A3	"
3.	"	"	41.25MC	"	"	A4	Attenuate signal generator to maintain 2.5 to 3 volts at VTVM. Adjust for MINIMUM deflection.
4.	"	"	42.5MC	"	"	A5	Attenuate signal generator to maintain 2.5 to 3 volts at VTVM. Adjust for MAXIMUM deflection.
5.	"	"	45.35MC	"	"	A6	"
6.	"	"	42.1MC	"	"	A7	"
7.	"	"	45.0MC	"	"	A8	Adjust for MAXIMUM deflection. Repeat steps 1 thru 7. Disconnect signal generator and replace IF plug in its socket on tuner.
8.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	42.1MC	Any non-interfering channel	"	A9	Adjust for MAXIMUM deflection.
9.	"	"	45.75MC	"	"	A10	Adjust for MAXIMUM deflection. Remove VTVM and 3 volt bias battery.

OVERALL VIDEO IF RESPONSE CHECK

Connect the negative lead of a 5MFD, 50 volt capacitor to the ungrounded side of C53. Connect the positive lead to chassis. Couple a second signal generator to an ungrounded tube shield floating over converter tube to provide markers on response curve. Connect the DC probe of VTVM to the ungrounded side of C38. Connect positive lead to chassis. Adjust sweep generator output for approximately 3.5 volts on VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	63MC (10MC Swp)	39.75MC 41.25MC 42.1MC 45.0MC 45.75MC	3	Vert. Amp. thru 22KΩ to point (B). Low side to chassis.		Check for response similar to Fig. 1. The 47.25MC, 41.25MC and 39.75MC markers should be at MINIMUM response. The 45.0MC marker should not exceed 97% or smear may occur on high channels. If necessary, SLIGHTLY retouch A5 thru A10 to obtain desired response. A9 affects position of 42.1MC marker. A5 affects peak of low frequency side of response curve. A8 affects high frequency peak of curve and position of 45.0MC marker. A6 affects position of the 45.75MC (video) marker. Remove bias battery, signal and sweep generators from ungrounded tube shield over converter tube and 5MFD, 50 volt capacitor. Replace V10 in its socket.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove V6 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point (C). Common to chassis.	A11, A12 A13	Adjust for MAXIMUM deflection.
12.	"	"	"	"	DC probe to point (E). Common to point (D).	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V6 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove V6 from its socket.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (C). Low side to chassis.	A11, A12 A13	Disconnect stabilizing capacitor C3. Adjust for curve of MAXIMUM amplitude and symmetry similar to Fig. 2.
12.	"	"	"	"	"	Vert. Amp. to point (E). Low side to chassis.	A14	Reconnect stabilizing capacitor C3. Adjust so that 4.5MC occurs at center of response curve as in Fig. 3. SLIGHTLY retouch A13 for MAXIMUM amplitude and straightness of crossover lines. Replace V6 in its socket.

ALIGNMENT INSTRUCTIONS (cont)

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4.5MC TRAP ALIGNMENT

If a 4.5MC signal generator of crystal accuracy capable of at least one volt output is not available tune in a TV station and adjust A15 for MINIMUM 4.5MC beat interference in the picture.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	.001MFD	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod.)	Any	DC probe thru detector (Fig. 4) to pin 2 (grid) of picture tube. Common to chassis.	A15	Remove V6 from its socket. Set contrast control for MAXIMUM contrast. Set generator for MAXIMUM output. Adjust A15 for MINIMUM deflection. Replace V6 in its socket.

VHF OSCILLATOR ALIGNMENT FOR TUNER #10534A , AND 10540A

Place converter tube shield to its normal position.
The channel oscillator adjustment screws are reached thru a hole just above and to the right of the channel switch shaft. The correct adjustment screws are reached through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp.)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point Ⓑ. Low side to chassis.	A16	Adjust to place sound marker as shown in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp.)	205.25MC 209.75MC	12		A17	
			201MC (10MC Swp.)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp.)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp.)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp.)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp.)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp.)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp.)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp.)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp.)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp.)	55.25MC 59.75MC	2		A27	

VHF RF AND MIXER ALIGNMENT FOR TUNER #10534A AND 10540A

The RF and Mixer portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

VHF OSCILLATOR ALIGNMENT FOR TUNER #10535C

The oscillator alignment for tuner 10535C is identical to the oscillator alignment for tuner 10534A and 10540A with the following exception.
This tuner has an all channel oscillator adjustment. Complete oscillator alignment may not be necessary in this tuner (10535C). If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A28.
It should be noted that this is an all channel oscillator adjustment and should not be used to correct any one channel.
If adjustment A28 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustments for each channel that is off frequency. The channel adjustment screws for this tuner (10535C) are reached thru a hole (hole extends thru UHF Tuner) just above and slightly to the left of the channel switch shaft. See step 14 for the individual oscillator channel strip adjustment.

VHF RF AND MIXER ALIGNMENT FOR TUNER #10535C

The RF and Mixer portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

UHF ALIGNMENT FOR TUNER #10540A AND 10535C

The UHF portion of these tuners have been properly aligned at the factory and are very stable. Alignment of this portion is not recommended in the field.

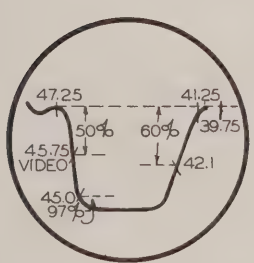


FIG. 1

FIG. 2

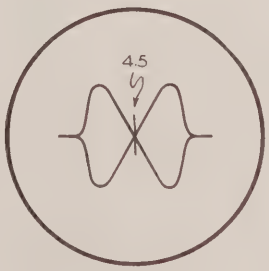


FIG. 3

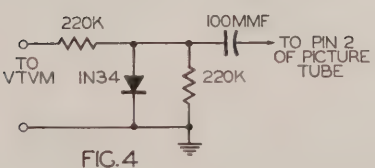


FIG. 4

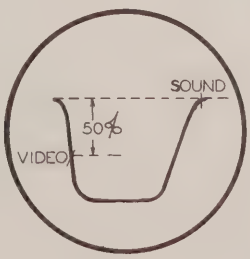
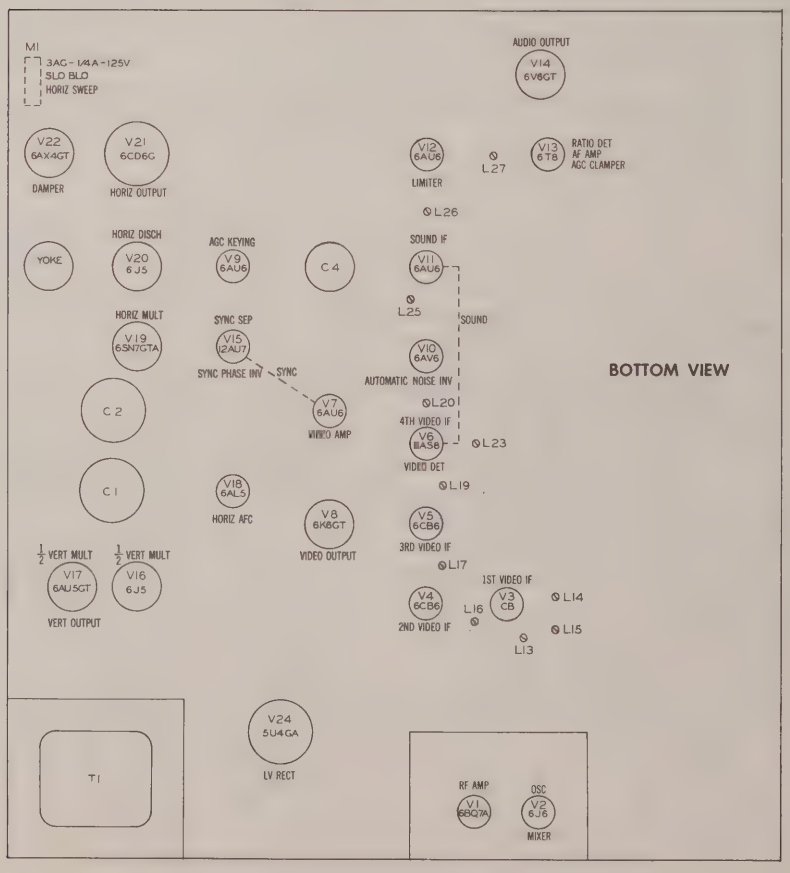


FIG. 5

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	1. 6Meg	0Ω	. 1Ω	0Ω	†550Ω	220KΩ	INF	0Ω
V 2	6J6	†6. 5KΩ	†17KΩ	. 1Ω	0Ω	235KΩ	10KΩ	0Ω		
V 3	6CB6	25KΩ	68Ω	0Ω	. 1Ω	†2. 1KΩ	†2. 1KΩ	0Ω		
V 4	6CB6	25KΩ	100Ω	0Ω	. 1Ω	†2 KΩ	†2 KΩ	0Ω		
V 5	6CB6	25KΩ	68Ω	0Ω	. 1Ω	†1. 9KΩ	†1. 9KΩ	0Ω		
V 6	6AS8	†2KΩ	. 1Ω	180Ω	0Ω	. 1Ω	2. 7KΩ	0Ω	60Ω	†2KΩ
V 7	6AU6	2. 7KΩ	0Ω	0Ω	. 1Ω	†5. 1KΩ	†1. 8KΩ	210Ω		
V 8	6K6GT	TP	0Ω	†3. 9KΩ	†1. 8KΩ	470KΩ	TP	. 1Ω	900Ω	
V 9	6AU6	†75KΩ	†1. 8KΩ	. 1Ω	0Ω	300KΩ	†41Ω	†1. 8KΩ		
V 10	6AV6	75KΩ	2. 7KΩ	0Ω	. 1Ω	2. 7KΩ	60Ω	†100KΩ		
V 11	6AU6	1. 1Ω	0Ω	0Ω	. 1Ω	†2. 8KΩ	†2. 8KΩ	120Ω		
V 12	6AU6	68KΩ	0Ω	0Ω	. 1Ω	†17KΩ	†17KΩ	120Ω		
V 13	6T8	INF	20KΩ	INF	. 1Ω	0Ω	550KΩ	0Ω	4. 7Meg	†470KΩ
V 14	6V6GT	NC	0Ω	†1. 1KΩ	†550Ω	470KΩ	NC	. 1Ω	470Ω	
V 15	12AU7	†1. 5Meg	4. 7Meg	0Ω	0Ω	0Ω	†8. 4KΩ	†1. 5Meg	2. 2KΩ	. 1Ω
V 16	6J5	TP	0Ω	▲4. 5Meg	TP	470KΩ	TP	. 1Ω	70KΩ	
V 17	6AU5GT	2. 2Meg	. 1Ω	600Ω	NC	†550Ω	NC	0Ω	†35KΩ	
V 18	6AL5	12KΩ	12KΩ	0Ω	. 1Ω	1. 6Meg	0Ω	1. 6Meg		
V 19	6SN7GTA	12KΩ	†100KΩ	1. 5KΩ	2. 5Meg	5. 6KΩ	†1. 5KΩ	. 1Ω	0Ω	
V 20	6J5	TP	0Ω	†180KΩ	TP	220KΩ	TP	. 1Ω	0Ω	
V 21	6CD6G	NC	0Ω	100Ω	NC	470KΩ	NC	. 1Ω	†10KΩ	TOP CAP ▲8. 5Ω
V 22	6AX4GT	NC	NC	5Meg	NC	†60Ω	NC	. 1Ω	0Ω	
V 23	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲320Ω
V 24	5U4GB	NC	25KΩ	NC	13Ω	NC	15Ω	NC	25KΩ	
V 25	24DP4A	0Ω	1Meg	PIN 6 ▲5Meg	PIN 10 ▲600KΩ	PIN 11 †270KΩ	PIN 12 . 1Ω			

†MEASURED FROM PIN 2 OF V24.
▲MEASURED FROM PIN 3 OF V22.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Packard-Bell PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BQ7A	6BQ7A	9AJ	6BZ7 used as an alternate
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	4th. Video IF Amp.+ Video Detector	6AS8	6AS8	9DS	
V7	Video Amplifier	6AU6	6AU6	7BK	
V8	Video Output	6K6GT	6K6GT	7S	
V9	AGC Keying	6AU6	6AU6	7BK	
V10	Automatic Noise Inverter	6AV6	6AV6	7BT	
V11	Sound IF Amp.	6AU6	6AU6	7BK	
V12	Limiter	6AU6	6AU6	7BK	
V13	Ratio Det.- AF Amp.-AGC Clamper	6T8	6T8	9E	
V14	Audio Output	6V6GT	6V6GT	7AC	
V15	Sync Separator-Sync Phase Inv.	12AU7	12AU7	9A	
V16	Vert. Mult.	6J5	6J5	6Q	6J5GT used as an alternate
V17	Vert. Mult.-Vert. Output	6AU5GT	6AU5GT	6CK	
V18	Horiz. AFC	6AL5	6AL5	6BT	
V19	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V20	Horiz. Discharge	6J5	6J5	6Q	6J5GT used as an alternate
V21	Horiz. Output	6CD6G	6CD6G	5BT	
V22	Damper	6AX4GT	6AX4GT	4CG	
V23	HV Rectifier	1B3GT	1B3GT	3C	
V24	LV Rectifier	5U4GB	5U4GB	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: Packard-Bell PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V25	24DP4A ①	24DP4A ①	24DP4A ①	24DP4A ② 24DP4	24DP4A ① 24DP4	12L 12L	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: Packard-Bell PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1A	▰80	400	24082	FP450	TM-4046	Q-020	
B	■20	400					
C	▲10	400					
C2A	▰80	400	24080	FP333.2	TM-D80-450	T-552	
B	■80	350		TC78	TD-100-50	MT-4540	
C	▲100	50					
C3	5	50	24038	TC30	TD-5-50	MMT-0505	
C4A	■25	25	24086		TM-4117		
B	▲25	25					
C	100	15					
D	▰5	75					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: Packard-Bell PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C5	3-8			829-10			
C6	3-8			829-10			
C7	1000						
C8	3			TCZ-3R3	NP0A-030	ZT-5533	
C9	.5-3			829-3	3115-01-0R5	CT565A	
C10	1000						
C11	120			DD-121	811-121	UC-5312	
C12	1000						
C13	1000						
C14	51			DD-500	831-510	UC-545	
C15	.5-3			829-3	3115-01-0R5	CT565A	
C16	10			TCZ-10	NP0K-100	ZT-541	
C17	5						
C18	1500			DD-152	801-0015	DC-5215	
C19	1500			DD-152	801-0015	DC-5215	
C20	6.8			TCZ-6R8	NP0A-6R8	ZT-5568	
C21	1500			DD-152	801-0015	DC-5215	
C22	110			TCN-110	N750L-111		
C23	1000						
C24	1000						
C25	10000		23939	DD-103	811-01	DC-511	Note 1
C26	10000		23939	DD-103	811-01	DC-511	Note 1
C27	470		23916	DD-471	831-471	UC-5347	Note 1
C28	5000		23931	DD-502	811-005	DC-525	
C29	2.2		23969	TCZ-2R2	NP0A-2R2		
C30	22	500		TCZ-22	NP0K-220	MCB225	
C31	4.7		23978	TCZ-4R7	NP0A-4R7	ZT-555	
C32	30	500		TCZ-30	NP0L-300		
C33A	10000		23962	DD3-103	811-01	DC-511	
B	10000				811-01	DC-511	
C34A	4000			D6-402	822-004	DCD-524	Note 2
B	4000			D6-402			Note 2
C35	5000		23931	DD-502	811-005	DC-525	
C36	30	500		TCZ-30	NP0L-300		
C37A	4000			D6-402	822-004	DCD-524	Note 2
B	4000			D6-402			Note 2
C38	1.0	100	23040			PT41	
C39	4.7		23978	TCZ-4R7	NP0A-4R7	ZT-555	
C40	22	500		TCZ-22	NP0K-220	MCB225	

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Packard-Bell PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C41A	4000			D6-402 }	822-004	DCD-524	Note 2
B	4000			D6-402 }			Note 2
C42	5000		23931	DD-502	811-005	DC-525	
C43	10000		23939	DD-103	811-01	DC-511	
C44	10000		23939	DD-103	811-01	DC-511	
C45	5		23908	TCZ-4R7	NP0A-050	ZT-555	
C46	10		23927	TCZ-10	NP0K-100	ZT-541	
C47	5000		23931	DD-502	811-005	DC-525	
C48	.047	600	23143	DF-503		PT601	
C49	.1	600	23145	DF-104		PT401	
C50	.1	200	23107	DF-104		PT401	
C51	470	1000	23967	DD-471	1R5KV-471	DC30347	
C52	10000		23939	DD-103	811-01	DC-511	
C53	.1	200	23107	DF-104		PT401	
C54	10000		23939	DD-103	811-01	DC-511	
C55	.1	200	23107	DF-104		PT401	
C56	2.2		23969	TCZ-2R2	NP0A-2R2		
C57	75			TCN-75	N750L-750	NT-5447	
C58	10000		23939	DD-103	811-01	DC-511	
C59	470		23916	DD-471	831-471	UC-5347	
C60	10000		23939	DD-103	811-01	DC-511	
C61	470		23916	DD-471	831-471	UC-5347	
C62	.0033	600	23136	D6-332	GP2-333-332	PT6233	
C63	.047	200	23105	DF-503		PT4147	
C64	.01	600	23139	D6-103	GP2-333-103	PT611	
C65	10000		23939	DD-103	811-01	DC-511	
C66	10000		23939	DD-103	811-01	DC-511	
C67	.047	600	23143	DF-503		PT6147	
C68	.0047	600	23137	D6-472	GP2-333-472	PT6247	
C69	1500		23936	DD-152	801-0015	DC-5215	
C70A	2000					DC-522	
B	5000		♦	♦PC-100	♦1405-01	DC-525	
C	5000					DC-525	
C71	.0022	600	23135	D6-222	GP2-333-222	PT6222	
C72	.001	600	23133	D6-102	GP2L-102	PT621	
C73	.47	200	23111			PT4047	
C74	1200	500	23219				
C75	.001	600	23133	D6-102	GP2L-102	PT621	
C76	.033	600	23043				
C77	.1	600	23145	DF-104		PT601	
C78	.1	600	23145	DF-104		PT601	
C79	.25	600	23147			PT6025	
C80	.01	600	23139	D6-103	GP2-333-103	PT611	
C81	1500		23936	DD-152	801-0015	DC-5215	
C82	1500		23936	DD-152	801-0015	DC-5215	
C83	5000		†23960	DD-502	811-005	DC-525	
C84	.047	200	23105	DF-503		PT4147	
C85	4000	500	23208			MCB463	
C86	1200	500	23219				
C87	.0022	600	23135	D6-222	GP2-333-222	PT6222	
C88	5000		23931	DD-502	811-005	DC-525	
C89	270		23943	DD-271	811-271	UC-5327	
C90	5000		23931	DD-502	811-005	DC-525	
C91	.1	600	23145	DF-104		PT601	
C92	10000		23939	DD-103	811-01	DC-511	Note 3
C93	10000		23939	DD-103	811-01	DC-511	
C94	56	3500	23990	DD60-560			
C95	.05	600	23143	DF-503		PT615	
C96	.05	600	23143	DF-503		PT615	
C97	.047	600	23143	DF-503		PT6147	
C98A	1500		23981	DD2-152	812-0015	DCD-5215	
B	1500						
C99	470	1000	23967	DD-471	1R5KV-471	DC30347	
C100	500	20000	23959	TV3-502	413	HV20035A	
C101	120	2000	23975	DD30-121			
C102A	10000	125VAC	23982A	DD-103			
B	10000	125VAC		DD-103			

Note 1. Used only in chassis with UHF.
Note 2. Some versions use 1500MMF in this application (part #23954).
Note 3. Chassis stamped 751 or higher use .22MFD in this application.
♦ Items C70A, C70B, C70C, R74A, R74B and R74C are combined in one unit.
Some versions use Mfgr. part #23980.
† Items C83 and R94 are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	5000Ω	½	25850A	F1-21		QJ-462♦	UF53R }	Contrast (Panel) See Note 1.
B	500KΩ	½		R2-44			UR55T154 } †	Volume (Rear) Tap at 100KΩ.
C	Switch			KB-1			US-26	Attach to R1B.
R2A	500KΩ	½	25518	AB-59	A47-500K-S	QJ1-133	U-50	Tone
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A.
R3A	1000Ω	2	25864A				UE35W	Vertical Linearity(Wire Wound) (Panel)
B	100Ω	2					Not Req.	Automatic Noise Inverter (Wire Wound)(Rear)
R4A	150KΩ	½	25860A	F1-32		QJ-785▲	UE1252	Vertical Hold (Panel)
B	5Meg	½		R2-83			Not Req.	Height (Rear)
R5A	500KΩ	½	25862	F1-40		QJ-787▲	UE1495	Brightness (Panel)
B	5Meg	½		R2-83			Not Req.	Focus (Rear)
R6A	50KΩ	½	25861	F1-29		QJ-786♦♦	UE986	Horizontal Drive (Panel)
B	25KΩ	½		R2-27			Not Req.	AGC (Rear)

♦CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B17-114, P1-112 (Panel)
B13-133X, R2-204 (Rear)
76-1, Switch

†Universal Replacement (Mallory Exact Duplicate Part No. UE525S)
▲CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-129, P11-102 (Panel)
B11-141, R15-028 (Rear)
▲CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-133, P9-104 (Panel)
B11-141, R15-028 (Rear)
♦♦CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-123, P11-102 (Panel)
B11-120, R15-028 (Rear)

Note 1. 1500Ω contrast control used in some versions.

PARTS LIST AND DES

RESIS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Packard-Bell PART No.	IRC PART No.	NOTES
R7	15KΩ	½			
R8	47KΩ	½			
R9	100KΩ	½			
R10	330KΩ	½			
R11	180KΩ	½			
R12	470Ω	½		BTS-470	
R13	15KΩ	½			
R14	10KΩ	½			
R15	15KΩ	½			
R16	4700Ω	½			
R17	220KΩ	½			
R18	470Ω	½	73021		Note 1
R19	1800Ω	½	73028	BTS-1800	
R20	120Ω	½	73014	BTS-120	
R21	100Ω	½		BTS-100	
R22	68Ω	½	73011	BTS-68	
R23	12KΩ	½	73028		
R24	120Ω	½	73014	BTS-120	
R25	100Ω	½		BTS-100	
R26	100Ω	½		BTS-100	
R27	8200Ω	½	73036		
R28	120Ω	½	73014	BTS-120	
R29	100Ω	½		BTS-100	
R30	68Ω	½	73011	BTS-68	
R31	3300Ω	½	73031		
R32	100Ω	½		BTS-100	
R33	180Ω	½	73016	BTS-180	
R34	3300Ω	½	73031		
R35	150Ω	½	73015	BTS-150	
R36	22KΩ	½	73041		
R37	470KΩ	½	73157		
R38	3900Ω	2	73432		
R39	2200Ω	½	73029	BTS-2200	Note 4
R40	470Ω	½	73021	BTS-470	
R41	1Meg	½	73161		
R42	220KΩ	½	73153		
R43	47KΩ 5%	½	73045	BTS-47K 5%	
R44	2.2Meg	½	73065		
R45	270KΩ	½	73054		
R46	390KΩ	½	73056		
R47	1Meg	½	73161		
R48	47KΩ 5%	½	73045		
R49	3300Ω	½	73031		
R50	2700Ω	½	73030		
R51	100KΩ	½	73149		
R52	2700Ω	½	73030		Note 4
R53	1000Ω	½	73025	BTS-1000	
R54	120Ω	½	73014	BTS-120	
R55	68KΩ	½	73047	BTS-68K	
R56	18KΩ	1	73240	BTA-18K	
R57	22KΩ	½	73041	BTS-22K	
R58	120Ω	½	73014	BTS-120	
R59	82Ω	½	73012	BTS-82	
R60	10KΩ	½	73037	BTS-10K	
R61	10KΩ	½	73037	BTS-10K	
R62	22KΩ	½	73041	BTS-22K	

Note 1. Used only in models
Note 2. Used only in models
Note 3. Used only on models
Note 4. Not used in some ve
♦ Items C70A, C70B, C70C,
Some versions use MFGR. P
† Items C83, R94 are combi

TRANSFOR

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	Packard-Bell PART No.	Halld PART
T1	117VAC @1.8A	500VCT .280ADC	5VAC @3A	89050	
	SEC. 3	SEC. 4	SEC. 5		
	6.3VAC @11.4A				

① Parallel and phase 6.3V@ 6A windings for Sec. 3, tape
② Parallel and phase 6.3V windings for Sec. 3, tape extra

TRANSFORMERS

ITEM No.	USE	Packard-Bell PART No.	Halldorson PART No.	PA
T2	Horiz. Output Trans.	89448B	FB419*	HV
T3	Vert. Output Trans.	89451	Z1804 ①	A-3
T4A	Yoke (90°)Horiz. (12MH)	29575	DF606 ③	MD
B	Vert. (39.5MH)			
T5	Horiz. Lin. Coil (1.6-8.5MH)	29569	RF800 ④ ⑤	MW
T6	Width Coil (4-23MH)	29568	RF800 ⑤ ⑧	MW

① Drill new mounting holes.
② Connect as auto transformer.
③ Connect horizontal damping network across terminals #
④ Connect to terms #3 & #4.
⑤ Enlarge mounting hole.
⑥ Connect to coded blue & green terminals.
⑦ Connect to coded red & blue terminals.
⑧ Connect to terminals #1 & #2.

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	NOTES
C41A	4000			D6-402	832-004	DCD-524		Note 2
B	4000			D6-402				Note 2
C42	5000		23931	DD-502	811-005	DC-525		
C43	10000		23939	DD-103	811-01	DC-511		
C44	10000		23939	DD-103	811-01	DC-511		
C45	5		23905	TCZ-4R7	NP0A-050	ZT-555		
C46	10		23927	TCZ-10	NP0K-100	ZT-541		
C47	5000		23931	DD-502	811-005	DC-525		
C48	.047	600	23143	DF-503		PT601		
C49	.1	600	23145	DF-104		PT401		
C50	.1	200	23107	DF-104		PT401		
C51	470	1000	23967	DD-471	1R5KV-471	DC30347		
C52	10000		23939	DD-103	811-01	DC-511		
C53	.1	200	23107	DF-104		PT401		
C54	10000		23939	DD-103	811-01	DC-511		
C55	.1	200	23107	DF-104		PT401		
C56	2.2		23969	TCZ-2R2	NP0A-2R2			
C57	75			TCN-75	NY3CL-750	NT-5447		
C58	10000		23939	DD-103	811-01	DC-511		
C59	470		23916	DD-471	831-471	UC-5347		
C60	10000		23939	DD-103	811-01	DC-511		
C61	470		23916	DD-471	831-471	UC-5347		
C62	.0033	600	23135	D6-332	GP3-333-332	PT6332		
C63	.047	200	23105	DF-503		PT4147		
C64	.01	600	23139	D6-103	GP3-333-103	PT631		
C65	10000		23939	DD-103	811-01	DC-511		
C66	10000		23939	DD-103	811-01	DC-511		
C67	.047	600	23143	DF-503		PT6147		
C68	.0047	600	23137	D6-472	GP3-333-472	PT6347		
C69	1500		23936	DD-152	801-0015	DC-5215		
C70A	5000					DC-532		
B	5000		*	*PC-100	*4105-01	DC-535		
C	5000					DC-525		
C71	.0033	600	23135	D6-332	GP3-333-332	PT6332		
C72	.001	600	23133	D6-102	GP3L-103	PT631		
C73	.47	200	23111			PT4047		
C74	1200	500	23219					
C75	.001	600	23133	D6-102	GP3L-103	PT631		
C76	.033	600	23042					
C77	.1	600	23145	DF-104		PT401		
C78	.1	600	23145	DF-104		PT401		
C79	25	600	23147			PT3025		
C80	.01	600	23139	D6-103	GP3-333-103	PT631		
C81	1500		23936	DD-152	801-0015	DC-5215		
C82	1500		23936	DD-152	801-0015	DC-5215		
C83	5000		123960	DD-502	811-005	DC-525		
C84	.047	200	23105	DF-503		PT4147		
C85	4000	500	23206			MCM463		
C86	1200	500	23219					
C87	.0022	600	23125	D6-222	GP3-333-222	PT6222		
C88	5000		23931	DD-502	811-005	DC-525		
C89	270		23943	DD-271	811-271	DC-5327		
C90	5000		23931	DD-502	811-005	DC-525		
C91	.1	600	23145	DF-104		PT401		
C92	10000		23939	DD-103	811-01	DC-511		Note 3
C93	10000		23939	DD-103	811-01	DC-511		
C94	56	3500	23909	DD60-560				
C95	.05	600	23143	DF-503		PT6147		
C96	.05	600	23143	DF-503		PT615		
C97	.047	600	23143	DF-503		PT6147		
C98A	1500		23981	DD2-152	812-0015	DCD-5215		
B	1500							
C99	470	1000	23967	DD-471	1R5KV-471	DC30347		
C100	500	20000	23959	TY3-502	413	HV30358A		
C101	120	2000	23975	DD30-121				
C102A	10000	125VAC	23982A	DD-103				
B	10000	125VAC		DD-103				

Note 1. Used only in chassis with UHF.
Note 2. Some versions use 1500MMF in this application (part #23954).
Note 3. Chassis stamped 751 or higher use .33MFD in this application.
* Items C70A, C70B, C70C, R74A, R74B and R74C are combined in one unit.
Some versions use MFGR. part #23980.
† Items C83 and R94 are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500Ω	½	25850A	F1-21		QJ-463*	UF53R	Contrast (Panel) See Note 1.
B	500KΩ	½		R3-44			UR55T154 †	Volume (Rear) Tap at 100KΩ.
C	Switch			KB-1			US-26	Attach to R1B.
R2A	500KΩ	½	25518	AB-59	A47-500K-S	QU1-133	U-50	Tone
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R2A.
R3A	100Ω	2	25854A				UE35W	Vertical Linearity(Wire Wound) (Panel)
B	100Ω	2					Not Req.	Automatic Noise Inverter (Wire Wound)(Rear)
R4A	150KΩ	½	25860A	F1-32		QJ-785A	UE1263	Vertical Hold (Panel)
B	5MEG	½		R2-63			Not Req.	Height (Rear)
R5A	500KΩ	½	25862	F1-40		QJ-787A	UE1495	Brightness (Panel)
B	5MEG	½		R2-63			Not Req.	Focus (Rear)
R6A	50KΩ	½	25861	F1-39		QJ-786**	UE2395	Horizontal Drive (Panel)
B	25KΩ	½		R2-27			Not Req.	AGC (Rear)

*CONCENTRIKIT EQUIVALENT; K-3 KIT, BASE ELEMENTS AND SHAFTS; B11-114, P1-112 (Panel) B15-133X, R2-304 (Rear) 76-1, Switch

†Universal Replacement (Mallory Exact Duplicate Part No. UE5255)

▲CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-139, P11-102 (Panel) B11-141, R15-028 (Rear)

●CONCENTRIKIT EQUIVALENT; K-3 KIT, BASE ELEMENTS AND SHAFTS; B11-123, P9-106 (Panel) B11-141, R15-028 (Rear)

●●CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-123, P11-102 (Panel) B11-120, R15-028 (Rear)

Note 1. 1500Ω contrast control used in some versions.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Packard-Bell PART No.	IRC PART No.	NOTES
R7	15KΩ	½			
R8	47KΩ	½			
R9	100KΩ	½		BTS-470	
R10	330KΩ	½			
R11	180KΩ	½			
R12	470Ω	½			
R13	15KΩ	½			
R14	10KΩ	½			
R15	15KΩ	½			
R16	4700Ω	½			
R17	220KΩ	½			
R18	470Ω	½	73021		Note 1
R19	180KΩ	½	73038	BTS-1800	
R20	120Ω	½	73014	BTS-120	
R21	100Ω	½		BTS-100	
R22	68Ω	½	73011	BTS-68	
R23	12KΩ	½	73028		
R24	120Ω	½	73014	BTS-120	
R25	100Ω	½		BTS-100	
R26	100Ω	½		BTS-100	
R27	8200Ω	½	73036		
R28	120Ω	½	73014	BTS-120	
R29	100Ω	½		BTS-100	
R30	68Ω	½	73011	BTS-68	
R31	3300Ω	½	73031		
R32	100Ω	½		BTS-100	
R33	180Ω	½	73018	BTS-180	
R34	330Ω	½	73025		
R35	150Ω	½	73015	BTS-150	
R36	22KΩ	½	73041		
R37	470KΩ	½	73157		
R38	3900Ω	2	73422		
R39	3300Ω	½	73038	BTS-3300	Note 4
R40	470Ω	½	73031	BTS-470	
R41	1MEg	½	73161		
R42	220KΩ	½	73153		
R43	47KΩ 5%	½	73045	BTS-47K 5%	
R44	2.2MEg	½	73065		
R45	270KΩ	½	73054		
R46	390KΩ	½	73056		
R47	1MEg	½	73161		
R48	47KΩ 5%	½	73045		
R49	330Ω	½	73031		
R50	2700Ω	½	73030	BTS-10K	
R51	100KΩ	½	73149		
R52	2700Ω	½	73030		Note 4
R53	1000Ω	½	73025	BTS-1000	
R54	120Ω	½	73014	BTS-120	
R55	56KΩ	½	73047	BTS-56K	
R56	15KΩ	1	73340	BTA-15K	
R57	22KΩ	½	73041	BTS-22K	
R58	120Ω	½	73014	BTS-120	
R59	82Ω	½	73013	BTS-82	
R60	10KΩ	½	73029	BTS-10K	
R61	10KΩ	½	73037	BTS-10K	
R62	22KΩ	½	73041	BTS-22K	

ITEM No.	RATING OHMS	RATING WATT	Packard-Bell PART No.	IRC PART No.	NOTES
R63	33KΩ	½	73043	BTS-33K	
R64	4.7MEg	½	73159	BTS-4.7MEg	
R65	470KΩ	½	73157	BTS-470K	
R66	470KΩ	1	73157	BTS-470K	
R67	470Ω	1	73231	BTA-470	
R68	470Ω	1	73231	BTA-470	
R69	4.7MEg	½	73159		
R70	1.5MEg	½	73163		
R71	3300Ω	½	73031		
R72	3300Ω	½	73031		
R73	22000Ω	½	73029		
R74A	22KΩ	½			
B	22000Ω	½	*		
C	22000Ω	½			
R75	68KΩ	½	73047		
R76	470KΩ	½	73157		
R77	1MEg	½	73161		
R78	22KΩ	½	73041		
R79	2.2MEg	½	73165		
R80	39KΩ	½	73044		
R81	56KΩ	1	73246		
R82	1500Ω	½	73027		
R83	5600Ω	½	73230		
R84	56KΩ	½	73046		
R85	270KΩ	½	73054		
R86	100KΩ	½	73149		
R87	150KΩ	½	73151		
R88	100KΩ	½	73149		
R89	560Ω	½	73022		
R90	560Ω	½	73023		
R91	100KΩ	½	73049		
R92	100KΩ	½	73149		
R93	1.5MEg	½	73163		
R94	1MEg	½	†23980		
R95	12KΩ	½	73039		
R96	5600Ω	½	73234		
R97	100KΩ	1	73249		
R98	100KΩ	½	73149		
R99	1500Ω	½	73027		
R100	220KΩ	½	73153		
R101	180KΩ	½	73052		
R102	10KΩ	½	73037		
R103	470KΩ	½	73157		
R104	10KΩ	5	73242	1.5AA-10K	
R105	15Ω	½			Note 2
R106	470KΩ	½	73157		
R107	2200Ω	½	73239		
R108	270KΩ	½	73254		
R109	12KΩ	½	73038		
R110	68000Ω	½			Note 2
R111	1MEg	1	73396	BTA-1MEg	
R112	1MEg	1	73396	BTA-1MEg	
R113	1800Ω	20	73672	20-1750	
R114	100KΩ	½	73249	BTS-100K	
R115	2700Ω	½	73030	BTS-2700	Note 4

Note 1. Used only in models using UHF/VHF tuner 10535.
Note 2. Used only in models with 751 or higher stamped on chassis.
Note 3. Used only on models with 740 or higher stamped on chassis.
Note 4. Not used in some versions.
* Items C70A, C70B, C70C, R74A, R74B, R74C are combined in one unit.
Some versions use MFGR. Part No. 23980.
† Items C83, R94 are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING	Packard-Bell PART No.	Halloran PART No.	Merit PART No.	RCA TYPE No	Stancor PART No	Thordarson PART No.	Triad PART No
T1	PRI: 117VAC ① 1.9A SEC. 1: 500VCT ② 240MA SEC. 2: 5VAC ② 3A SEC. 3: 6.3VAC ② 1.4A SEC. 4: 6.3VAC ② 2.5A SEC. 5: 6.3VAC ② 6A	69060		F-2830 ①				36R33 ②

① Parallel and phase 6.3VⓊ 6A windings for Sec. 3, tape 6.3VⓊ 1.25A winding.
② Parallel and phase 6.3V windings for Sec. 3, tape extra 5V winding. Use low taps on HV Sec Tape other taps.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	Packard-Bell PART No	Halloran PART No	Merit No.	RCA TYPE No	Ram PART No	Stancor PART No.	Thordarson PART No.	Triad PART No
T2	Horiz. Output Trans.	69448B	F1949*	HVO-36*	2357**	30947		F1y-19*	D-50*
T3	Vert. Output Trans.	69451	21804 Ⓐ	A-3037 Ⓐ	2227I Ⓐ	V313 Ⓐ	A-8123 Ⓐ	26S52 Ⓐ	A-102X
T4A	Yoke (90°)Horiz. (12MH) Vert. (39.5MH)	29515	DF506 Ⓑ	MDF-91 Ⓑ	237D1 Ⓑ		DY-13A Ⓑ	Y-14 Ⓑ	Y-40-1 Ⓑ
B	Horiz. Lin. Coil (1.6-8.5MH)	29569	RF800 Ⓒ Ⓔ	MWC-6 Ⓒ Ⓔ	215R1	201R15	WC-8	WC-22	WC-12 Ⓒ Ⓔ
T6	Width Coil (4-23MH)	29568	RF800 Ⓓ Ⓔ	MWC-11	215R1	201R10 Ⓒ	WC-5 Ⓒ Ⓕ	WC-30 Ⓓ Ⓕ	WC-11 Ⓒ Ⓕ

① Drill new mounting holes.
② Connect an auto transformer.
③ Connect horizontal damping network across terminals #3 & #7. Use original if necessary.
④ Connect to terms #3 & #4.
⑤ Enlarge mounting hole.
⑥ Connect to coded blue & green terminals.
⑦ Connect to coded red & blue terminals.
⑧ Connect to terminals #1 & #2.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL (CONNECTIONS)	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
9	9	9	9	9		9	9
7	7	7	7	7		7	7
5	5	5	5	5		5	5
4	4	4	4	7		7	4
3	3	3	3	3		3	3
1	1	1	1	1		1	1
Connect Width Coil Across	3 & 1	3 & 1	3 & 1	3 & 1		3 & 1	3 & 1
Special Notes:	⑤	⑤	⑤	⑤		⑤	⑤

⑤ If resistor R110 is used, connect it in series with capacitor C101 across terms #3 & #7 of yoke.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No	NOTES
T7	7.5KΩ	6.6Ω	69439	21000 Ⓐ	A-2900 Ⓐ	A-3870	24S60 Ⓐ	S-51X Ⓐ	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP	Packard-Bell PART No	QUAM PART No.	NOTES
SP1	6 x 9"	PM	3.2Ω	83106	6SA3	
SP2	6 x 9"	PM	3.2Ω	83106	6SA3	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	Packard-Bell PART No.	MERSSNER PART No.	Merit PART No.	MULLER PART No.	NOTES
L1	IF Trap	0Ω						Wound on 68MMF Cap.
L2	IF Trap	0Ω						Wound on 56MMF Cap.
L3	Ant. Coils	90CT	0Ω					
L4	Fil. Choke	0Ω						
L5	IF Trap	1.1Ω						
L6	Neut. Coil	0Ω						
L7	RF, Mixer Grid, Osc. Coils	0Ω						
L8	Fil. Choke	0Ω						
L9	Feedback Coil	1.5Ω						6.8 Microhenries
L10	RF Coil	0Ω						
L11	Conv. Plate	.1Ω						
L12	RF Coil	1.6Ω		29566	19-1005		46I2	10 Microhenries
L13	1st Video IF	.1Ω		29569	20-1009*	TV-151	6325	
L14	4?.25MC Trap	0Ω		29564	20-1047		6319*	Tapped
L15	33.75MC Trap	0Ω		29565	20-1046			
L16	2nd Video IF	.1Ω	.1Ω	29565A	17-4533	TV-150	6319	
L17	3rd Video IF	.1Ω	.1Ω	29570A				Includes 4L 25MC Trap.
L18	FIL Choke	0Ω		29551	19-1001	TV-189	6175	
L19	4th Video IF	.1Ω	.1Ω	29565A	17-4533	TV-150	6319	Includes 4?.25MC Trap (Tapped)
L20	4?.25MC Trap	0Ω		29564	20-1047		6319*	Tapped
L21	5thVideo IF	.1Ω	.1Ω	29573A	17-4533	TV-150	6319	
L22	Shunt Peaking Coil			29509	19-3250	TV-185	6181	250 Microhenries-Not used in some versions.
L23	Noise Choke	1Ω			19-3250	TV-185	6181	250 Microhenries-Not used in some versions.
L24	Series Peaking Coil	6Ω		29553	19-3093*	TV-181*	6177*	83 Microhenries, Wound on 3900Ω resistor.
L25	4.5MC Trap	3.8Ω		29548	20-1005*	TV-151	1470	
L26	Series Peaking Coil	7.5Ω		29506	19-3125*	TV-183	6178	130 Microhenries, Wound on 22KΩ resistor
L27	1st Sound IF	1.1Ω		29563	17-2400	TV-181	1469	
L28	2nd Sound IF	.8Ω		29576A	17-1021*	TV-113*	1470-A	
L29	Ratio Det.	6.5Ω	1.4DCT	29026	17-2402	TV-119*	1468	Tertiary windings, 2Ω
L30	Horiz. Osc.	80Ω		29582	19-1576	TV-153	6238	

* Use one winding only.
● Parallel with 3.9KΩ resistor.
▲ Disconnect cap. in parallel.
● Parallel with 12KΩ resistor.
† Use adapter plate & use one winding.
†† Use adapter plate.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ᴖ	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
L31	280ADC	41Ω	1.6HY	27005	C5037 Ⓐ	C-3996	C-3336 Ⓐ	28C44 Ⓐ	C-17X

Ⓐ Drill one new mounting hole.

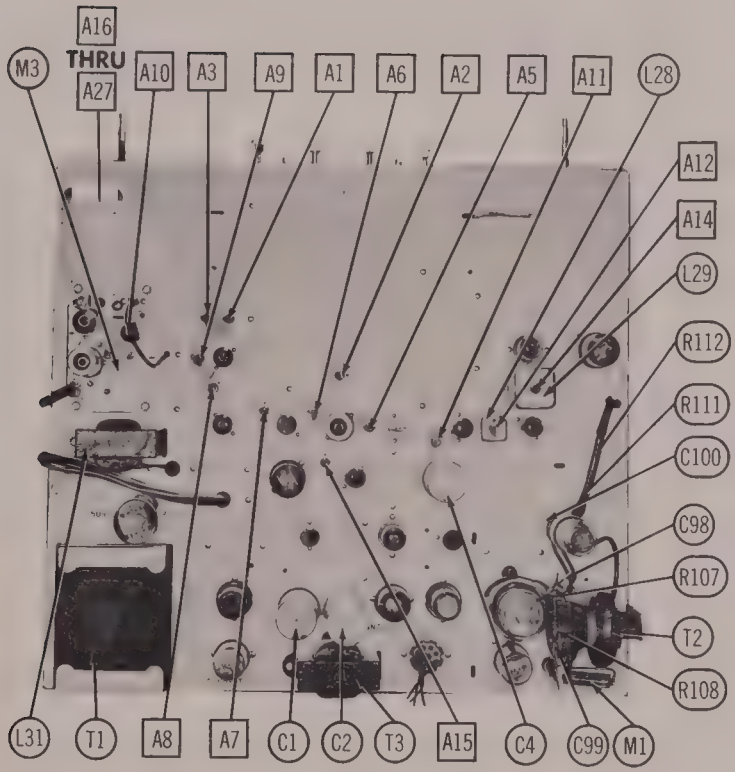
FUSES

ITEM No	TYPE	RATING	Packard-Bell PART No. FUSE	Packard-Bell PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG S/B	1/4A 125V	45005		313.250 (3AG S/B 1/4A)	357001	MDL 1/4	4405

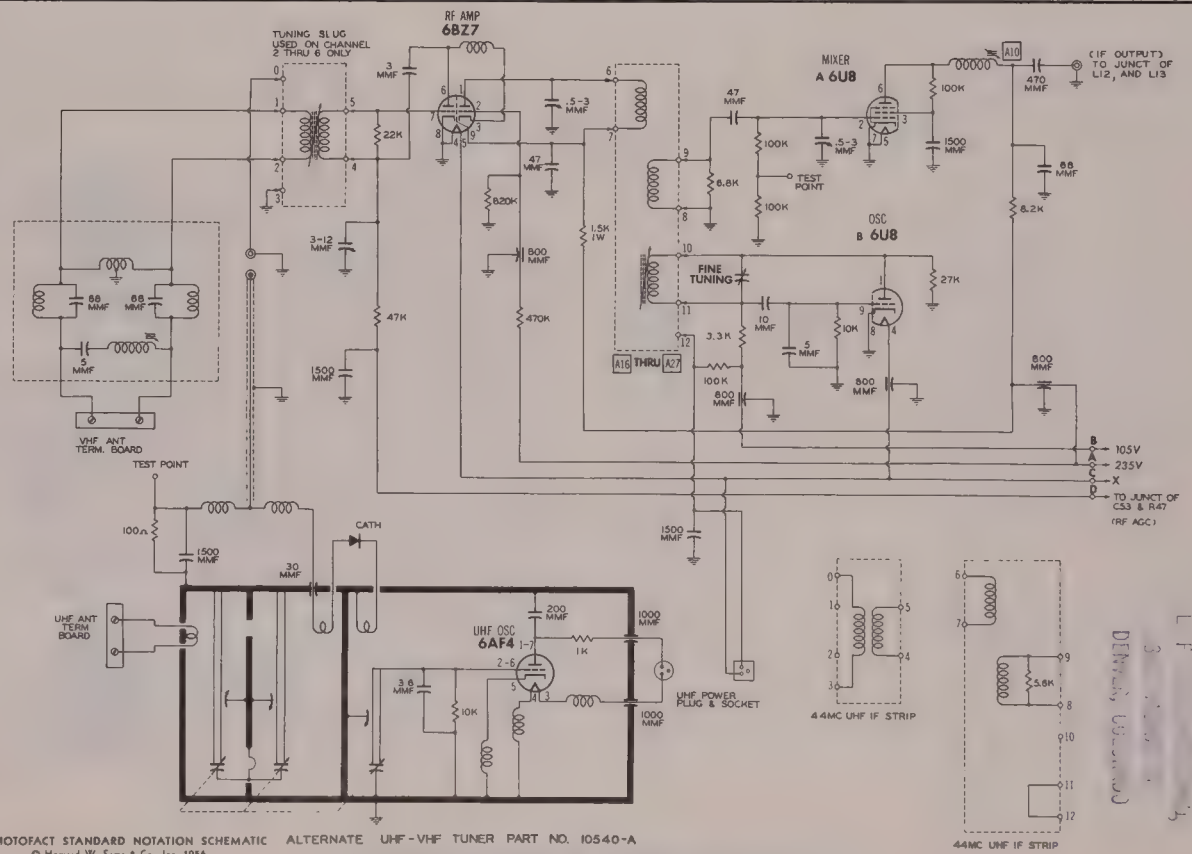
PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M2	Dial Light	54002	#47
M3	Tuner	10534C	VHF - Models 24203, 24205
M4	Tuner	10535C	VHF-UHF - Models 24203U, 24205U, (Some versions use tuner part #10540A in this application).
M5	Centering Device		
M6	Ion Trap	28106A	
	Cabinet		Specify model number and finish
	Knob	52121	Horiz. Hold
	Knob	52065H	Fine tuning - Models 24203, 24205, specify cabinet finish
	Knob	52067H	Contrast - Models 24203, 24205, specify cabinet finish
	Knob	52126A	Selector - Models 24203, 24205, specify cabinet finish
	Knob	52127A	On-off-volume - Models 24203, 24205, specify cabinet finish
	Knob	52087H	Contrast - Models 24203U, 24205U, specify cabinet finish
	Knob	52097	Fine tuning - Models 24203U, 24205U, specify cabinet finish
	Knob	52098	On-off-volume - Models 24203U, 24205U, specify cabinet finish
	Knob	52106B	VHF tuning - Models 24203U, 24205U, specify cabinet finish
	Knob	52106B	UHF tuning - Models 24203U, 24205U, specify cabinet finish



CHASSIS TOP VIEW



A PHOTOFACT STANDARD NOTATION SCHEMATIC ALTERNATE UHF-VHF TUNER PART NO. 10540-A

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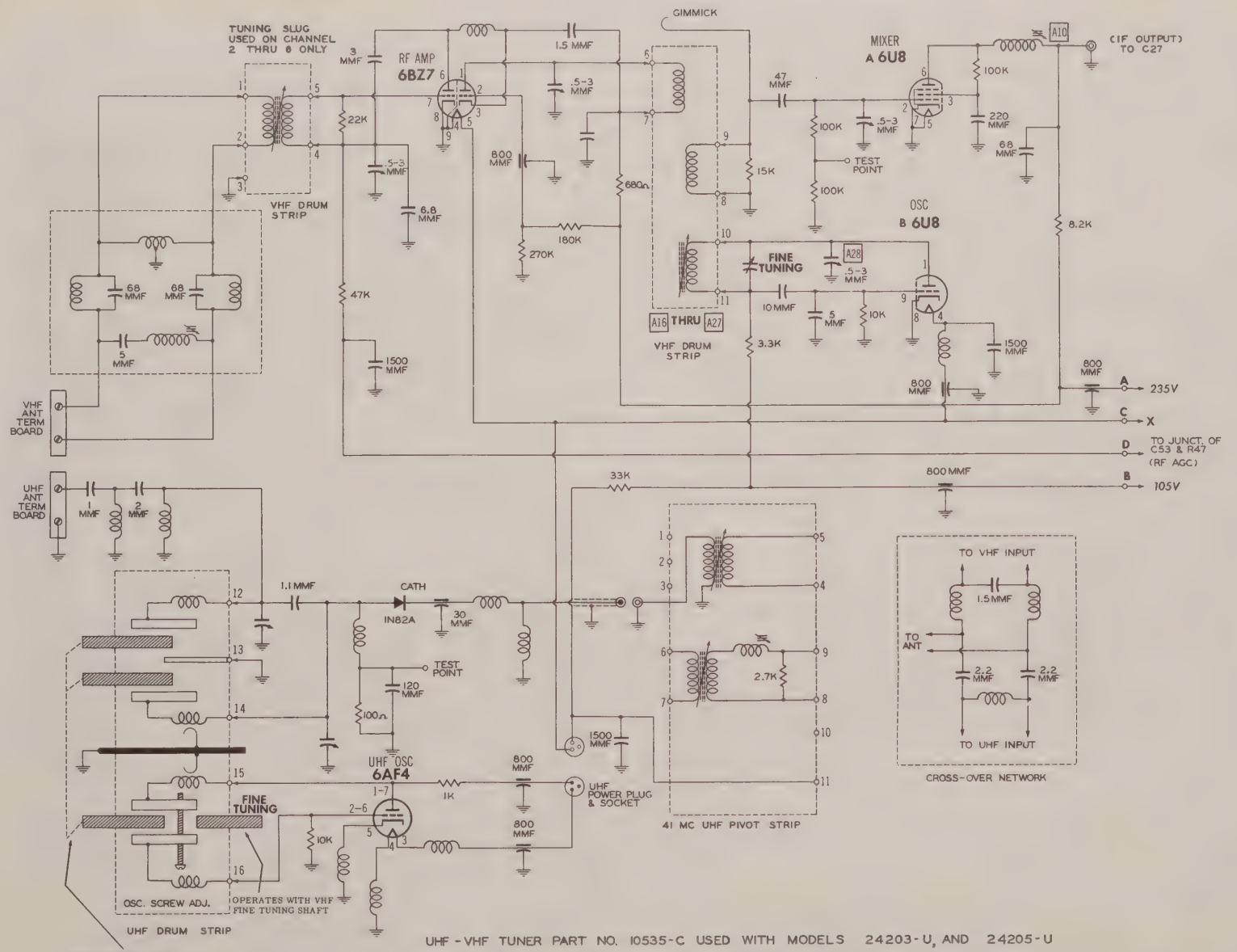
ALTERNATE UHF-VHF TUNER SCHEMATIC



UHF - VHF TUNER PART NO. 10535-C USED WITH MODELS 24203-U, AND 24205-U

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ALTERNATE UHF-VHF TUNER SCHEMATIC

PROPERTY OF
L. F. BLANKENSHIP
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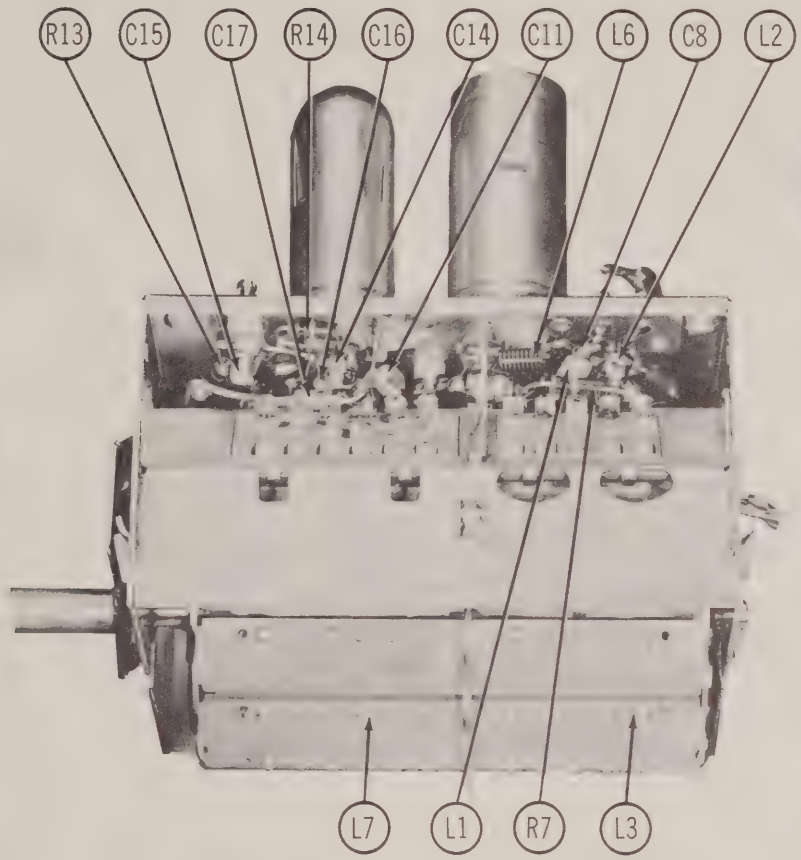
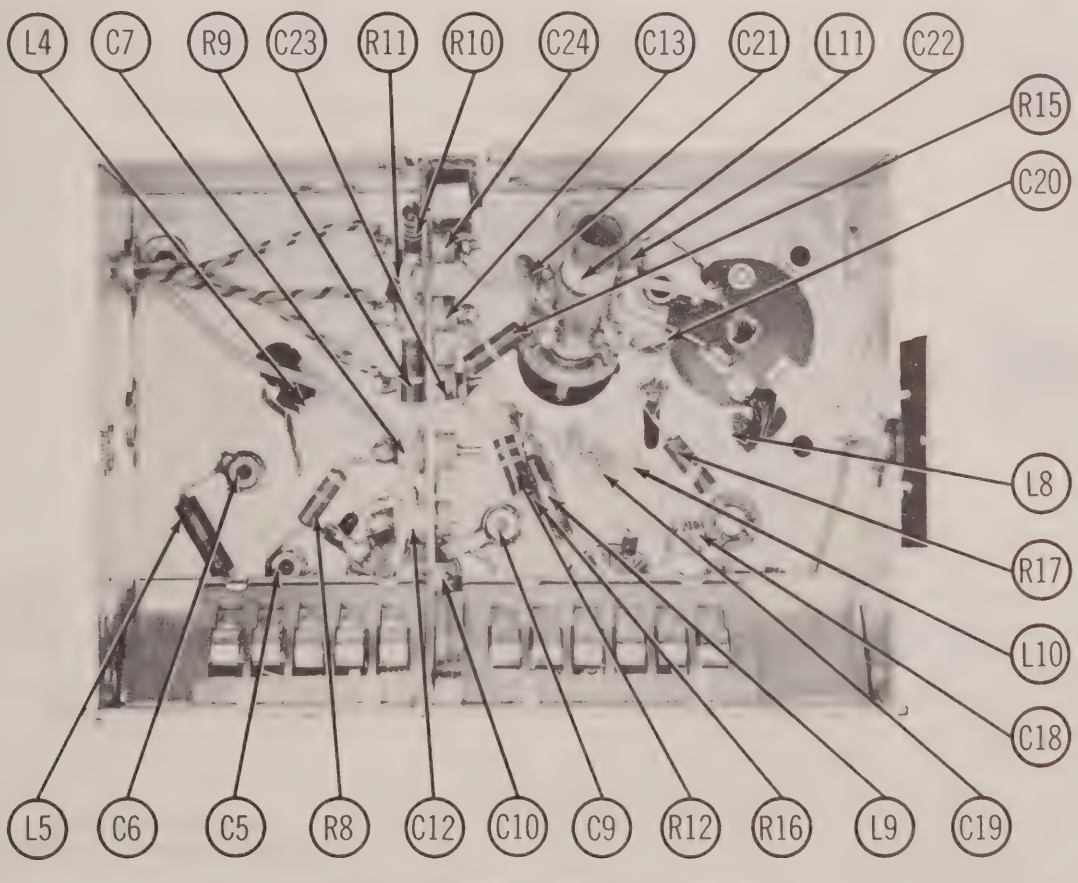
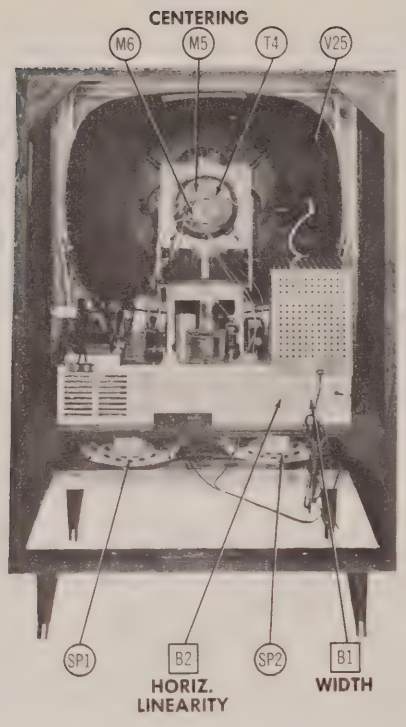


RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



CABINET–REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

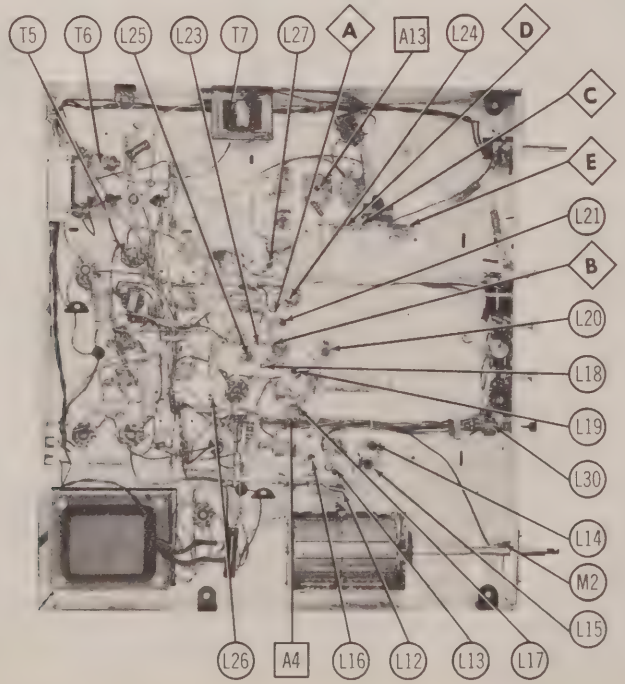
Adjust the horizontal oscillator slug (L28) (Labeled "Horizontal Hold" on front panel) until the picture synchronizes horizontally.

The correct setting of L28 slug is approximately half-way between the point where picture tears.

Adjust the horizontal drive control (R6A) in a clockwise direction as far as possible without the presence of vertical white lines or compression near center of the picture.

Adjust the width slug (B1) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the linearity slug (B2) for a picture that is symmetrical from left to right.

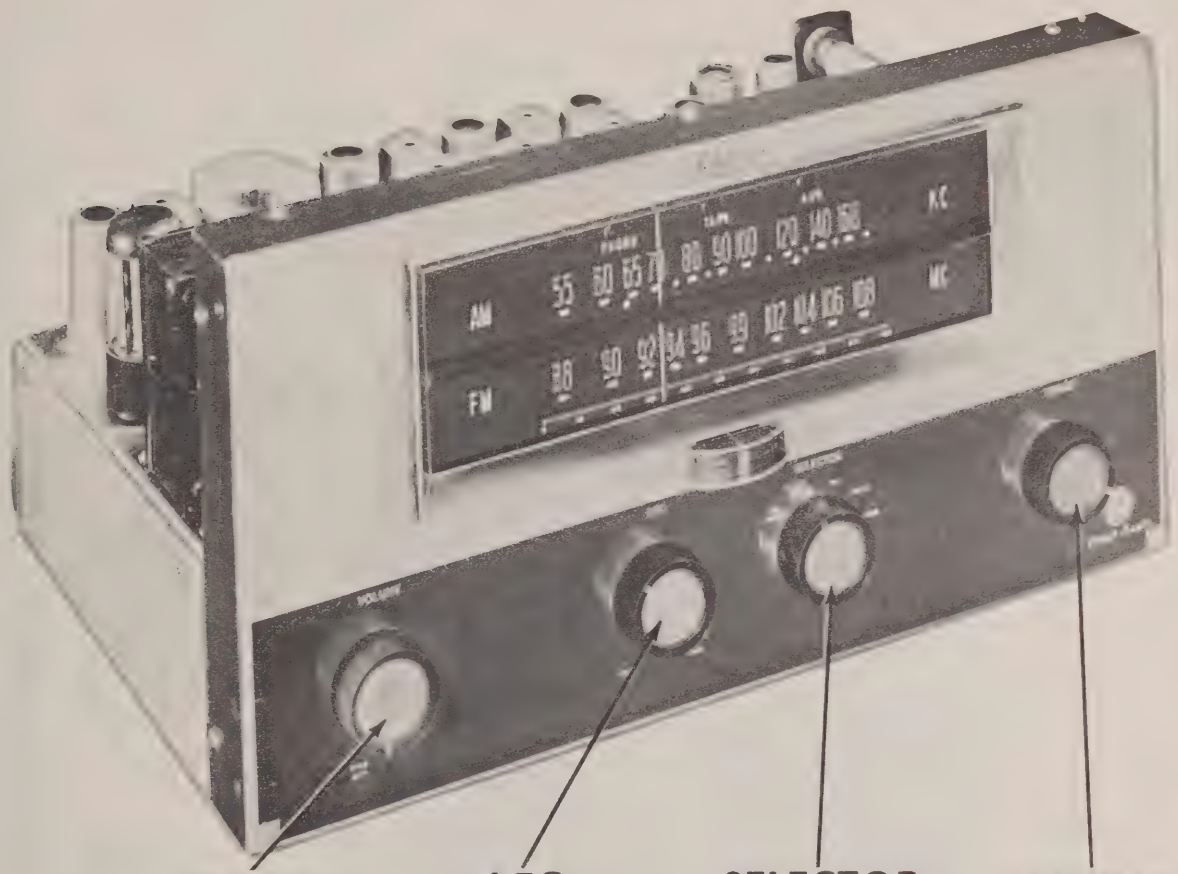


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

PILOT MODEL AF-850

PILOT MODEL AF-850

PILOT MODEL AF-850



TRADE NAME	Pilot Model AF-850		
MANUFACTURER	Pilot Radio Corp., 37-06 36th St., Long Island City 1, N. Y.		
TYPE SET	AC Operated AM-FM Superheterodyne Tuner for Custom Installation		
TUBES	Ten		
POWER SUPPLY	105-120 Volts AC-60 Cycles	RATING	.52 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540KC-1700KC	Freq. Mod.	88MC-108MC

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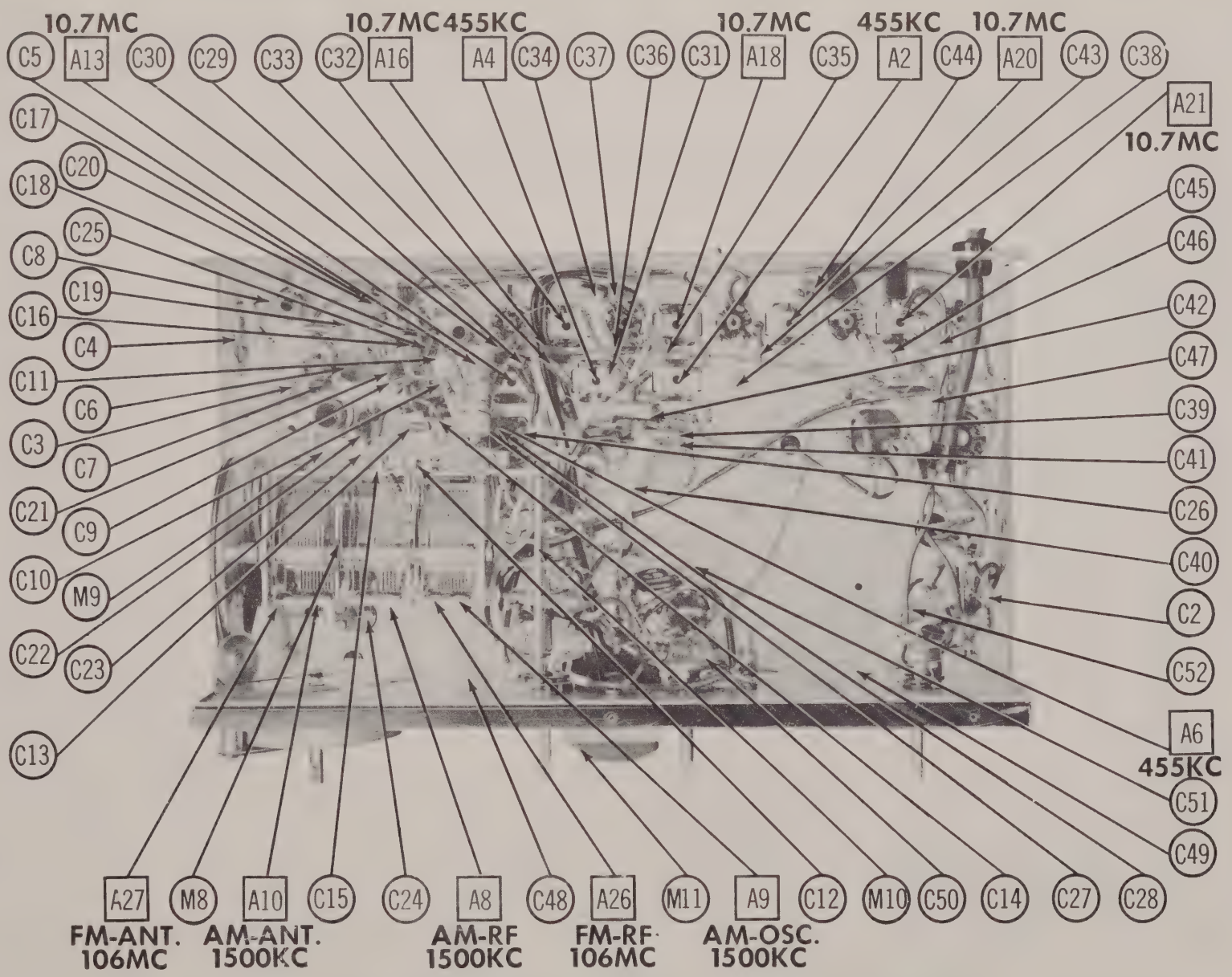

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Allow 30 minute warm-up period for receiver & equipment.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	455KC (400~ Mod.)	AM (Sharp)	55	DC probe to point (A). Common to chassis.	A1, A2, A3, A4, A5, A6	Adjust for maximum deflection.
2.	200MMF	High side to AM antenna terminal. Low side to chassis.	"	"	"	"	A7	Adjust for MINIMUM deflection.
3.	"	"	1500KC	"	150	"	A8, A9 A10	Adjust for MAXIMUM deflection.
4.	"	"	600KC	"	60	"	A11	Adjust for MAXIMUM deflection while rocking tuning gang.

WHISTLE FILTER ADJUSTMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.		High side to point A . Low side to chassis.	10.0KC	"	55	AC probe to audio output. Common to chassis.	A12, R3 (Whistle filter control)	Adjust for MINIMUM deflection.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	.01MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (Unmod.)	FM	88	DC probe to point (A). Common to chassis.	A13, A14 A15, A16 A17, A18	Adjust for MAXIMUM deflection.
7.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A19, A20	"
8.	"	"	"	"	"	DC probe to point (C). Common to chassis.	A22	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
9.	"	"	"	"	"	"	A21	Adjust for MAXIMUM deflection. Readjust A22.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
6.	.01MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (450KC Swp.)	FM	88	Vert. Amp. thru 25K to point (D). Low side to chassis.	A13, A14 A15, A16 A17, A18 A19, A20 A21	Adjust for curve of MAXIMUM amplitude and symmetry, similar to Fig. 1.
7.	"	"	"	"	"	Vert. Amp. to point (C).	A22	Adjust so that 10.7MC occurs at center of crossover lines, similar to Fig. 2. SLIGHTLY retouch A22 for MAXIMUM amplitude and straightness of crossover lines. Proceed with step 10.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10.	270Ω Carbon Resistor	High side thru 120Ω to FM antenna terminal. Low side to chassis.	90MC (Unmod.)	FM (AFC off)	90	DC probe to point (A). Common to chassis.	A23, A24	Adjust for MAXIMUM deflection.
11.	"	"	106MC	"	106	"	A25, A26 A27	"

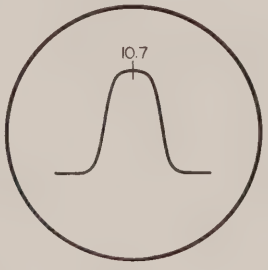

FIG. 1

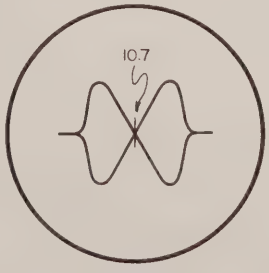

FIG. 2

PROPERTY OF
L I
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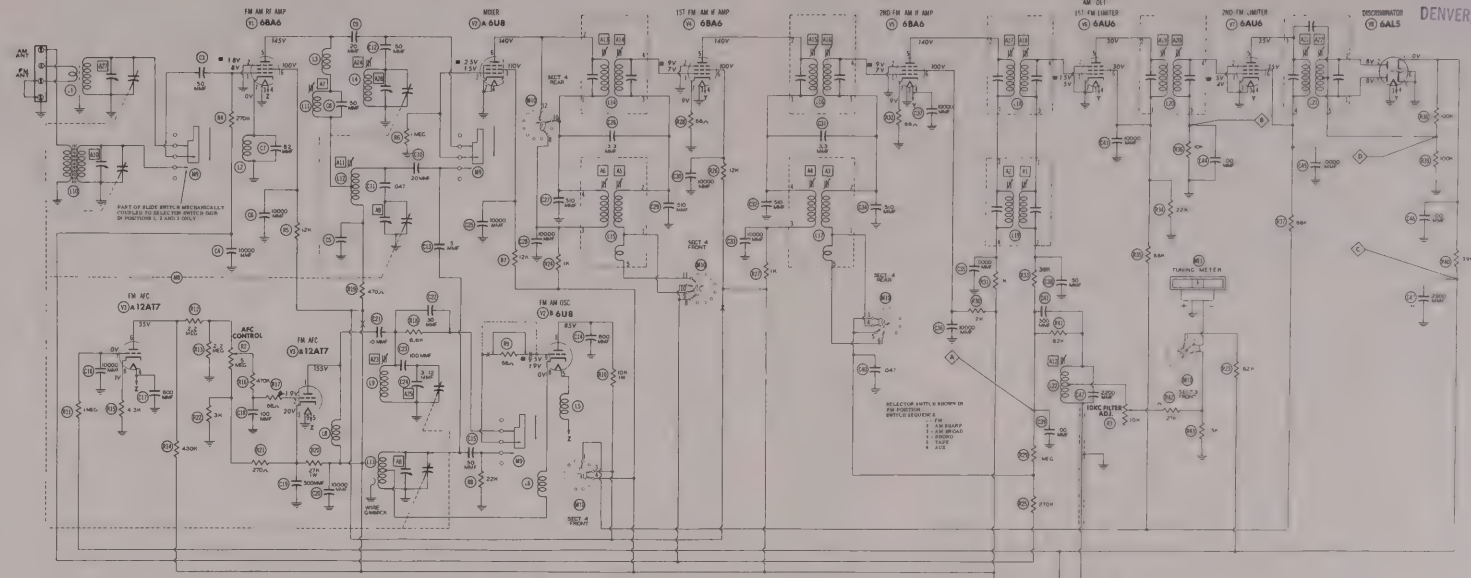
DENVER, COLORADO



AM IF = 455KC
FM IF = 10.7MC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BA6	1.5Meg	0Ω	0Ω	1Ω	†600Ω	†12KΩ	1Ω	—	—
V 2	6U8	†10.1KΩ	1Meg †470KΩ	†12.1KΩ	0Ω	1Ω	†1.1KΩ	0Ω	1.5Ω	4.5KΩ ●122Ω
V 3	12AT7	†120Ω	±1.5Meg	†27KΩ	1Ω	1Ω	†430KΩ	1Meg ±1.5Meg	4.3KΩ	0Ω
V 4	6BA6	1.5Meg	0Ω	0Ω	1Ω	†1.1KΩ	†12.1KΩ	68Ω	—	—
V 5	6BA6	1Meg	0Ω	0Ω	1Ω	†1.1KΩ	†12.1KΩ	68Ω		
V 6	6AU6	150KΩ	0Ω	0Ω	1Ω	†30KΩ	†20KΩ	0Ω		
V 7	6AU6	10KΩ	0Ω	0Ω	1Ω	†68KΩ	†68KΩ	0Ω		
V 8	6AL5	300KΩ	100KΩ	0Ω	1Ω	0Ω	0Ω	100KΩ		
V 9	12AU7	†43KΩ	0Ω 1Meg	1.5KΩ	3TKΩ	2TKΩ	15.7KΩ	480KΩ	10.4KΩ	2TKΩ
V 10	5Y3GT	NC	30KΩ	NC	6Ω	NC	50Ω	NC	30KΩ	

ALL MEASUREMENTS IN FM POSITION UNLESS DESIGNATED OTHERWISE
●MEASURED IN AM SHARP POSITION
▲MEASURED WITH AFC CONTROL IN MAXIMUM COUNTER CLOCKWISE POSITION
♦MEASURED WITH AFC CONTROL IN MAXIMUM CLOCKWISE POSITION.

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 cycles per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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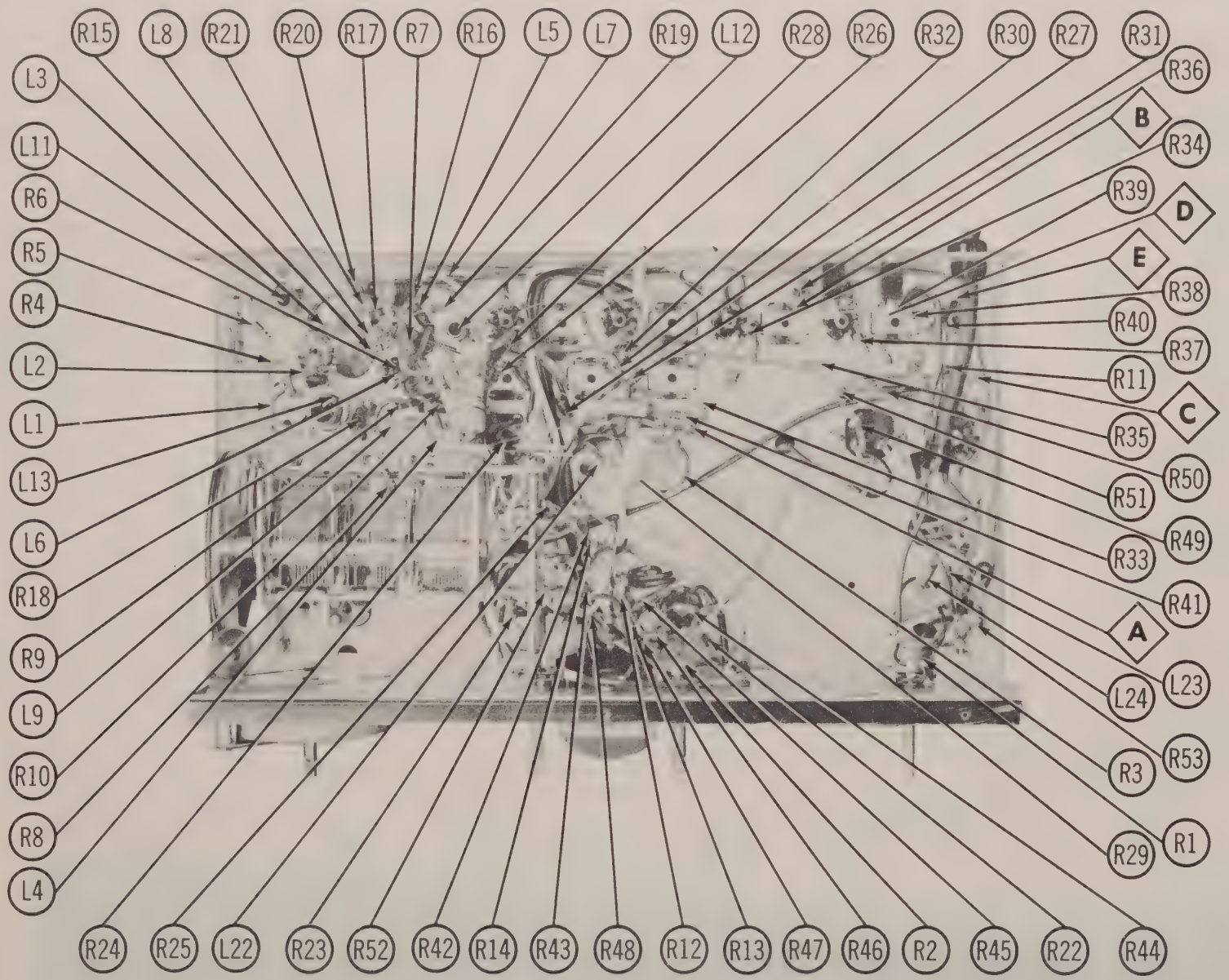
302-10



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: PILOT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	FM/AM RF Amp.	6BA6	6BA6	7BK	
V2	FM/AM Osc. - Mixer	6U8	6U8	9AE	
V3	FM AFC	12AT7	12AT7	9A	
V4	1st FM/AM IF Amp.	6BA6	6BA6	7BK	
V5	2nd FM/AM IF Amp.	6BA6	6BA6	7BK	
V6	1st FM Limiter - AM Det.	6AU6	6AU6	7BK	
V7	2nd FM Limiter	6AU6	6AU6	7BK	
V8	Discriminator	6AL5	6AL5	6BT	
V9	AF Amp. - Cathode Follower	12AU7	12AU7	9A	
V10	Rect.	5Y3GT	5Y3GT	5T	

ELECTROLYTIC CAPACITORS

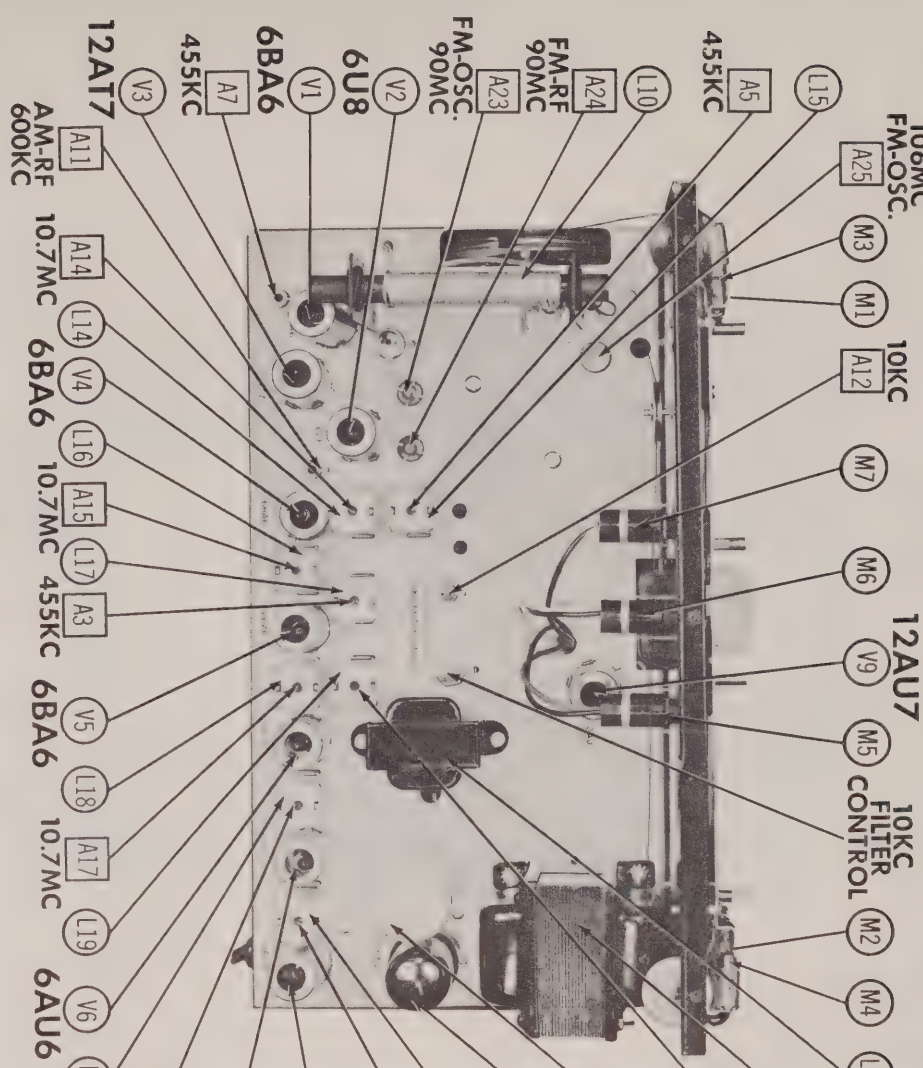
ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PILOT PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	NOTES
C1A	▲40	300		FP420.38	[TM-D40-300 TD-80-350	[D-140 FM-2540	
B	■80	250					
C	▲40	250					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PILOT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C2	30	1000		DD-330	1R5KV-330	DC30433	
C3	50			D6-500	GP1K-500	UC-545	
C4	10000			DD-103	811-01	DC-511	
C5	.1	400		DF-104		PT401	
C6	10000			DD-103	811-01	DC-511	
C7	82			D6-820	GP1K-820		
C8	50			TCZ-50	NP0-338-500	ZT-545	
C9	20			TCZ-20	NP0K-200	ZT-542	
C10	20			TCZ-20	NP0K-200	ZT-542	
C11	.047	400		DF-503		PT4147	
C12	50			D6-500	GP1K-500	UC-545	
C13	5			TCN-5	N750A-050	NT-555	
C14	800			DD-801	831-801	DC-521	
C15	50			D6-500	GP1K-500	UC-545	
C16	10000			DD-103	811-01	DC-511	
C17	800			DD-801	831-801	DC-521	
C18	100			D6-101	GP1K-101	UC-531	
C19	500			D6-501	GP2K-501	UC-535	
C20	10000			DD-103	811-01	DC-511	
C21	10						
C22	30			TCN-30	N750K-300		
C23	100			TCZ-100	NP0-337-101	ZT-531	
C24	3-12			822-FZ	557-3	ST-553-Z	
C25	10000			DD-103	811-01	DC-511	
C26	3.3			TCZ-3R3	NP0A-3R3	ZT-5533	
C27	510	500		TCN-510	N750-334-511		
C28	10000			DD-103	811-01	DC-511	
C29	510	500		TCN-510	N750-334-511		
C30	10000			DD-103	811-01	DC-511	
C31	3.3			TCZ-3R3	NP0A-3R3	ZT-5533	
C32	510	500		TCN-510	N750-334-511		
C33	10000			DD-103	811-01	DC-511	
C34	510	500		TCN-510	N750-334-511		
C35	10000			DD-103	811-01	DC-511	
C36	10000			DD-103	811-01	DC-511	
C37	10000			DD-103	811-01	DC-511	
C38	50			D6-500	GP1K-500	UC-545	
C39	100			D6-101	GP1K-101	UC-531	
C40	.047	400		DF-503		PT4147	
C41	500			D6-501	GP2K-501	UC-535	

CHASSIS—TOP VIEW



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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PILOT PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C42	2200	500					
C43	10000			DD-103	811-01	DC-511	
C44	100			D6-101	GP1K-101	UC-531	
C45	10000			DD-103	811-01	DC-511	
C46	100			D6-101	GP1K-101	UC-531	
C47	2900			D6-272	GP2-333-272	UC-5227	Note 1
C48	1000			DD-102	801-001	DC-521	Note 2
C49	.1	200		DF-104		PT401	
C50	.01	400		D6-103	GP3-333-103	PT411	
C51	.1	200		DF-104		PT401	
C52	.01	600		D6-103	GP3-333-103	PT611	

Note 1. Some versions use 2500MMF in this application.
Note 2. Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PILOT PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	36-59	Q13-137	A47-1Meg-Z	AB-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R1A.
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A.
R2A	5Meg	½	39-37B	Q11-141	A47-5Meg-S	B-87	U-67	AFC
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	10KΩ	½	39-38	Q11-116	A47-10K-S	B-14	U-20	10K filter adjustment
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R3A.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA PILOT PART No.	IRC PART No.	NOTES
R4	270KΩ	½		BTS-270K	
R5	12KΩ	½		BTS-12K	
R6	1Meg	½		BTS-1Meg	
R7	12KΩ	½		BTS-12K	
R8	22KΩ	½		BTS-22K	
R9	68Ω	½		BTS-68	
R10	10KΩ	1		BTA-10K	
R11	1Meg	½		BTS-1Meg	
R12	2.2Meg 5%	½		BTS-2.2Meg 5%	
R13	2.2Meg 5%	½		BTS-2.2Meg 5%	
R14	430KΩ 5%	½		BTS-430K 5%	
R15	4300Ω 5%	½		BTS-4300 5%	
R16	470KΩ	½		BTS-470K	
R17	68Ω	½		BTS-68	
R18	6800Ω	½		BTS-6800	
R19	470Ω	½		BTS-470	
R20	27KΩ	1		BTA-27K	
R21	270Ω	½		BTS-270	
R22	3000Ω 5%	½		BTS-3000 5%	
R23	82KΩ	½		BTS-82K	
R24	1000Ω	½		BTS-1000	
R25	270KΩ	½		BTS-270K	
R26	12KΩ	½		BTS-12K	
R27	1000Ω	½		BTS-1000	
R28	68Ω	½		BTS-68	
R29	1Meg	½		BTS-1Meg	
R30	12KΩ	½		BTS-12K	
R31	1000Ω	½		BTS-1000	
R32	68Ω	½		BTS-68	
R33	39KΩ	½		BTS-39K	
R34	22KΩ	½		BTS-22K	
R35	68KΩ	½		BTS-68K	
R36	10KΩ	½		BTS-10K	
R37	68KΩ	½		BTS-68K	
R38	100KΩ 5%	½		BTS-100K 5%	
R39	100KΩ 5%	½		BTS-100K 5%	
R40	39KΩ	½		BTS-39K	
R41	82KΩ	½		BTS-82K	
R42	27KΩ	½		BTS-27K	Note 1
R43	1500Ω	½		BTS-1500	
R44	39KΩ	½		BTS-39K	
R45	1500Ω	1		BTA-1500	
R46	470KΩ	½		BTS-470K	
R47	470Ω	½		BTS-470	
R48	10KΩ	½		BTS-10K	
R49	5600Ω	½		BTS-5600	
R50	27KΩ	½		BTS-27K	
R51	100KΩ	½		BTS-100K	
R52	2.7Ω	1		BW1-2.7	Note 2
R53	270KΩ	½		BTS-270	

Note 1. Some versions use a 22KΩ ½W resistor in this application.
Note 2. Some versions use a 3Ω 1W resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA PILOT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⓐ.52A	360VCT .068A	5VAC ⓐ2A	6.3VCT .3A SEC. 4 6.3VAC ⓐ2.6LA	55-43					

CHASSIS—BOTTOM VIEW

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PILOT PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω	0Ω	70-80				
L2	Cathode Choke	1Ω		75-33	19-1004		4529	5 Microhenries
L3	RF Choke	1Ω		75-33	19-1004		4529	5 Microhenries
L4	FM RF Coil	0Ω		71-40				
L5	Fil. Choke	0Ω		75-19	19-1001		4604	1.6 Microhenries
L6	Cathode Choke	1Ω		75-33	19-1004		4529	5 Microhenries
L7	Fil. Choke	0Ω		75-19	19-1001		4304	1.6 Microhenries
L8	RF Choke	1Ω		75-33	19-1004		4529	5 Microhenries
L9	FM Osc. Coil	0Ω		72-76				
L10	BC Ant. Coil	.1Ω	.2Ω	270-53				
L11	455KC Trap	26Ω		79-102				
L12	BC RF Coil	6.8Ω		71-41				Tapped ⓐ 2.2Ω
L13	BC Osc. Coil	2.8Ω		72-75	14-1033 *	BC-387 ▲	71-OSC ■	Tapped ⓐ .5Ω
L14	1st. FM IF	.7Ω	.7Ω	273-151	16-3487	FM-254	1463	
L15	1st. AM IF	5.3Ω	5.3Ω	273-152				Tertiary winding=.4Ω
L16	2nd. FM IF	.7Ω	.7Ω	273-151	16-3487	FM-254	1463	
L17	2nd. AM IF	5.3Ω	5.3Ω	273-152				Tertiary winding=.4Ω
L18	3nd. FM IF	.7Ω	.7Ω	273-151	16-3487	FM-254	1463	
L19	3rd. AM IF	8.5Ω	8.5Ω	273-129	16-6758	BC-353	12-C2	
L20	FM Limiter	.7Ω	.7Ω	273-151	16-3487	FM-254	1463	
L21	Discriminator	.8Ω	10CT	279-77				
L22	10KC Filter	320Ω		79-106				Tapped ⓐ 125Ω
L23	Line Choke	0Ω		75-19	19-1001		4604	1.6 Microhenries
L24	Line Choke	0Ω		75-19	19-1001		4604	1.6 Microhenries

* Drill mounting hole.
■ Use primary and drill mounting hole.
▲ Use secondary winding only.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA PILOT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L25	.068A	125Ω	4HY	57-16		C-2977①		20C59	

① Use original shield.

MISCELLANEOUS

ITEM No.	PART NAME	PILOT PART No.	NOTES
M1	Dial Light	68-6	#47-FM Dial
M2	Dial Light	68-6	#47-FM Dial
M3	Dial Light	68-6	#47-AM Dial
M4	Dial Light	68-6	#47-AM Dial
M5	Dial Light	68-6	#47-Phono position indicator
M6	Dial Light	68-6	#47-Tape position indicator
M7	Dial Light	68-6	#47-Aux. position indicator
M8	Tuning Cap.	26-59	6 Gang-AM Sections (32-495MMF, 32-495MMF, 22-165MMF)
M9	Switch		AM-FM (3 pole-3 position slide type) Mechanically ganged to M10
M10	Switch	100-96	Selector (Rotary-wafer type)
M11	Meter	110-490	Tuning

STEWART-WARNER MODELS 21C-9700W, WB, X, XB, 21T-9700R, RB

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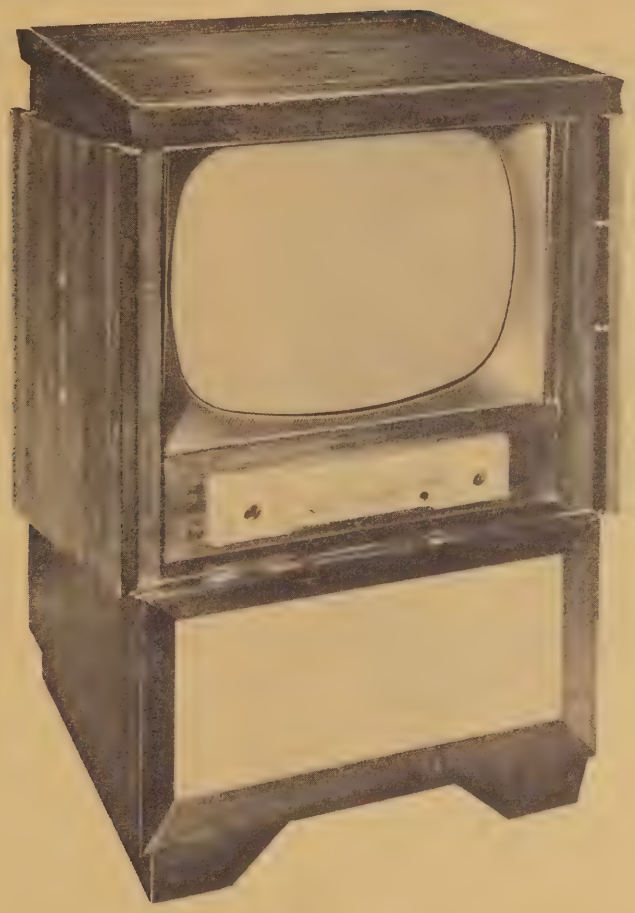

STEWART-WARNER MODEL 21C-9700X

TRADE NAME	Stewart-Warner Models 21C-9700W, 21C-9700WB, 21C-9700X, 21C-9700XB, 21T-9700R, 21T-9700RB
MANUFACTURER	Stewart-Warner Electric, Division of Stewart-Warner Corp., 1300 N. Kostner Ave., Chicago 15, Ill.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 Cycles — RATING 1.54 Amp. @ 117 Volts AC
TUNING RANGE–	Channels 2 thru 13, Video IF 26.0MC, Sound IF 21.5MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 1
Horizontal Sweep Circuit Adjustments 16
Parts List and Descriptions 12, 13, 14
Photographs
- Cabinet-Rear View 16
- Capacitor Identification 3, 10
- Chassis-Top View 11
- RF Tuner 15

Photographs (Cont)
- Resistor Identification 4, 9
- Trans., Inductor & Alignment Identification 11

Resistance Measurements 8
Servicing in the Field 1
Schematic 2
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

STEWART-WARNER MODELS 21C-9700W, WB, X, XB, 21T-9700R, RB

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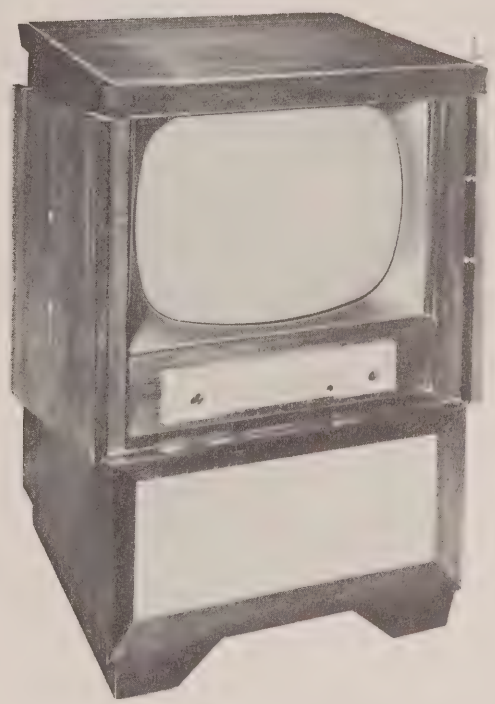

MODELS
21C-9700W, 21C-9700WB,
21C-9700X, 21C-9700XB,
21T-9700R, 21T-9700RB

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type control knobs from front panel of cabinet.

2. Remove 1 metal screw holding rear cover. Pull rear cover out at the bottom and down to remove.

3. Remove 2 wood screws holding antenna terminal bracket.

4. Disconnect speaker leads.

5. Remove 4 chassis bolts. Remove chassis.

6. Remove 2 speaker nuts and 2 wood screws. Remove speaker.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 wood screws holding wood molding located on the top edge of the safety glass. Remove molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

(See tube placement chart on page 5)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit may be made from the rear panel of the chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary slug (A22) located on top of the chassis. (See tube placement chart).

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

STEWART-WARNER MODELS
21C-9700W, WB, X, XB, 21T-9700R, RB

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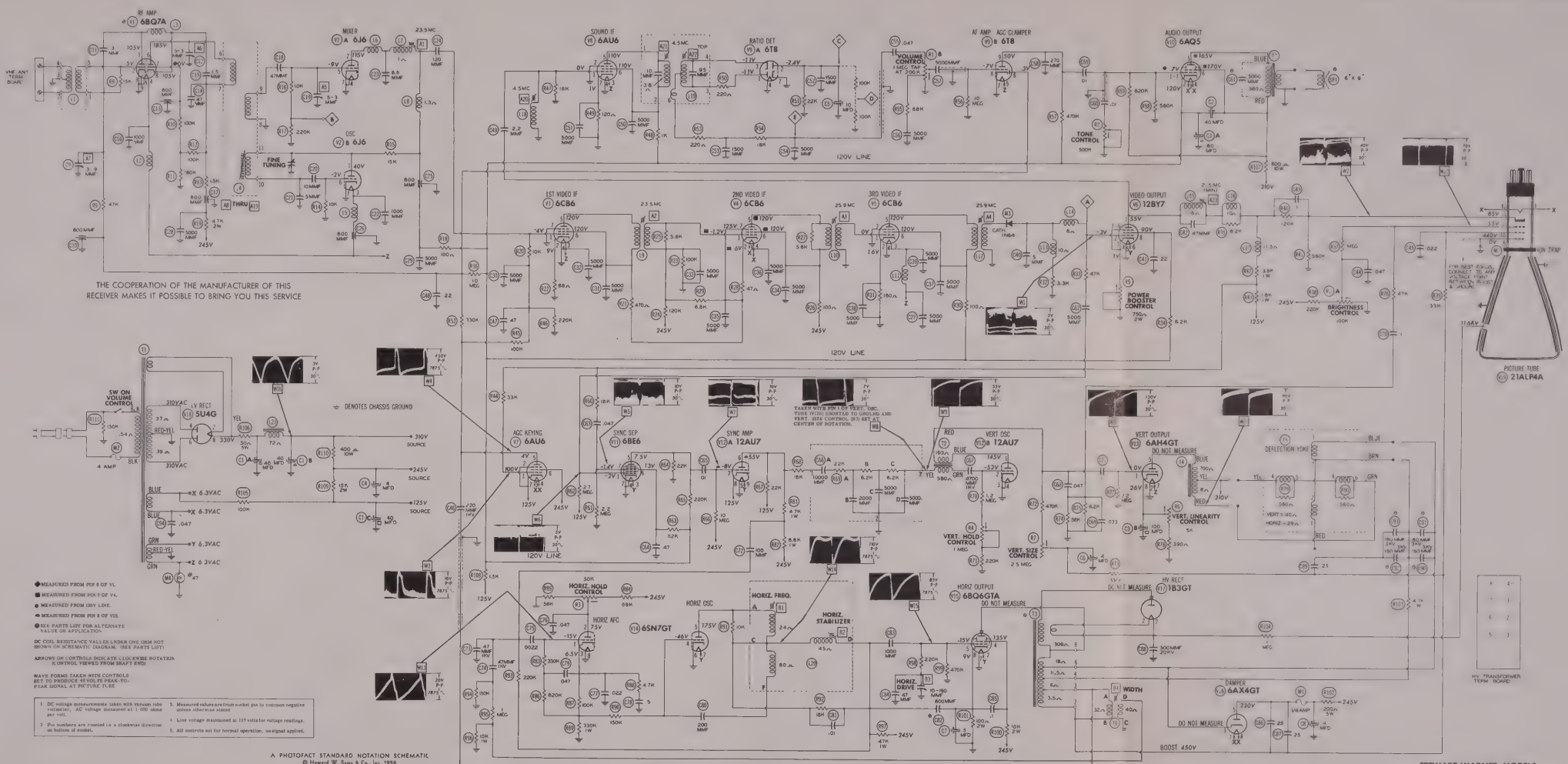
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
RF AMP 6BQ7A
MIXER 6J6
OSC 6J6
SOUND IF 6AU6
RATIO DET 6T8
AF AMP AGC CLAMPER 6T8
AUDIO OUTPUT 6AQ5
1ST VIDEO IF 6CB6
2ND VIDEO IF 6CB6
3RD VIDEO IF 6CB6
VIDEO OUTPUT 12BY7
AGC KEYING 6AU6
SYNC SEP 6BE6
SYNC AMP 12AU7
VERT OSC 12AU7
VERT OUTPUT 6AH4GT
HORIZ AFC 6SN7GT
HORIZ OUTPUT 6BQ6GTA
HV RECT 1B3GT
DAMPER 6AX4GT
PICTURE TUBE 21ALP4A
LV RECT 5U4G
SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
TONE CONTROL
VOLUME CONTROL
POWER BOOSTER CONTROL
BRIGHTNESS CONTROL
HORIZ. HOLD CONTROL
HORIZ. FREQ.
HORIZ. STABILIZER
HORIZ. DRIVE
WIDTH
VERT. HOLD CONTROL
VERT. SIZE CONTROL
VERT. LINEARITY CONTROL
DEFLECTION YOKE
HV TRANSFORMER TERM. BOARD
120V LINE
BOOST 450V
DO NOT MEASURE
4 AMP
310VAC
245V SOURCE
125V SOURCE
X 6.3VAC
Y 6.3VAC
Z 6.3VAC
◆ MEASURED FROM PIN 8 OF V1.
■ MEASURED FROM PIN 7 OF V4.
● MEASURED FROM 120V LINE.
➡ MEASURED FROM PIN 8 OF V12.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 40 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1 000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, as signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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STEWART-WARNER MODELS
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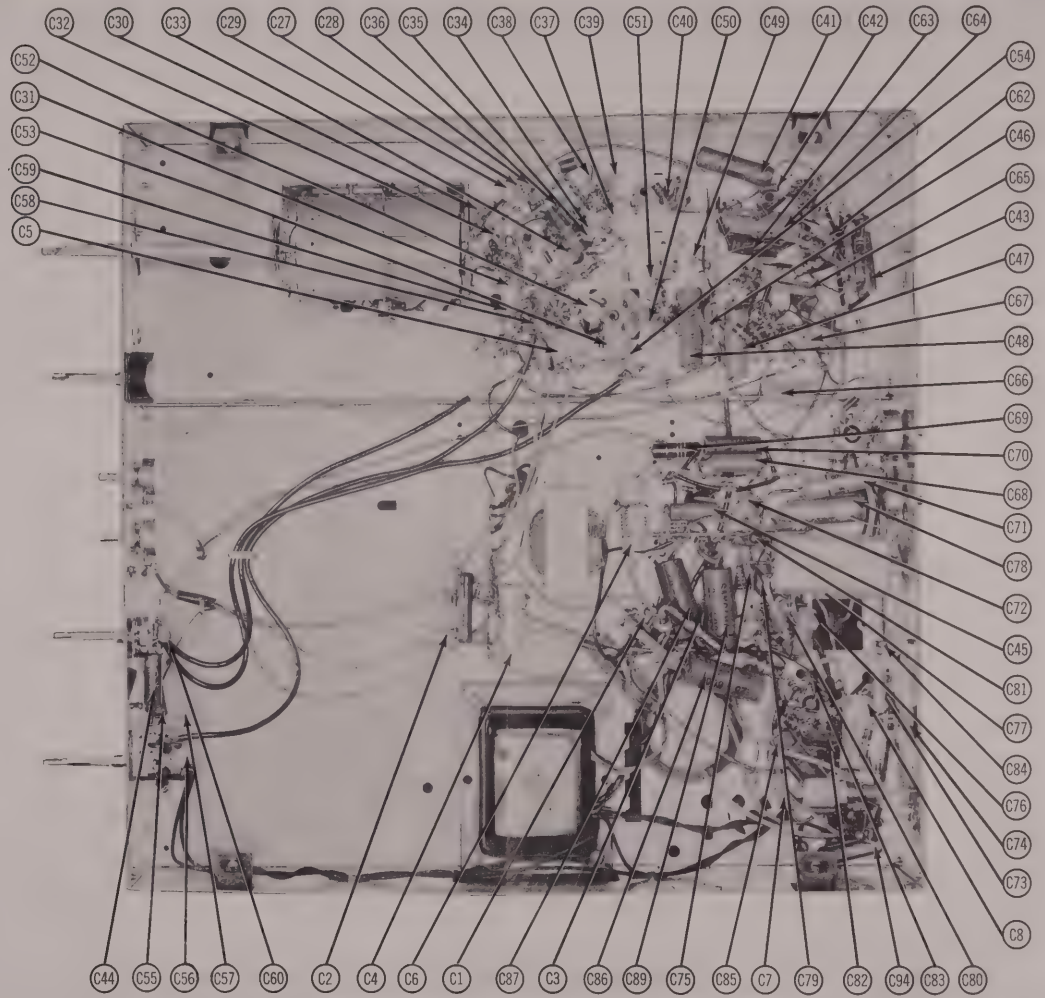

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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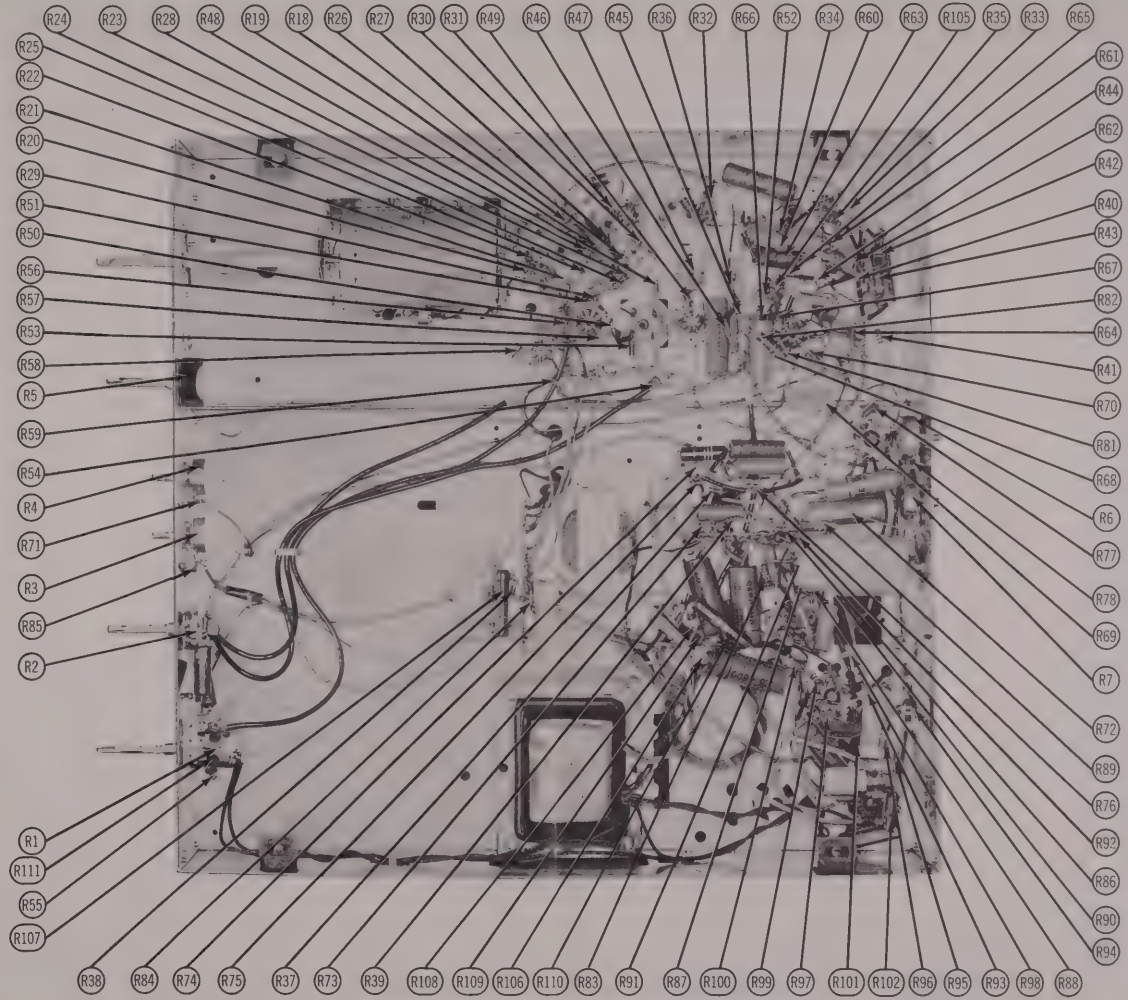

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

TUBE PLACEMENT CHART

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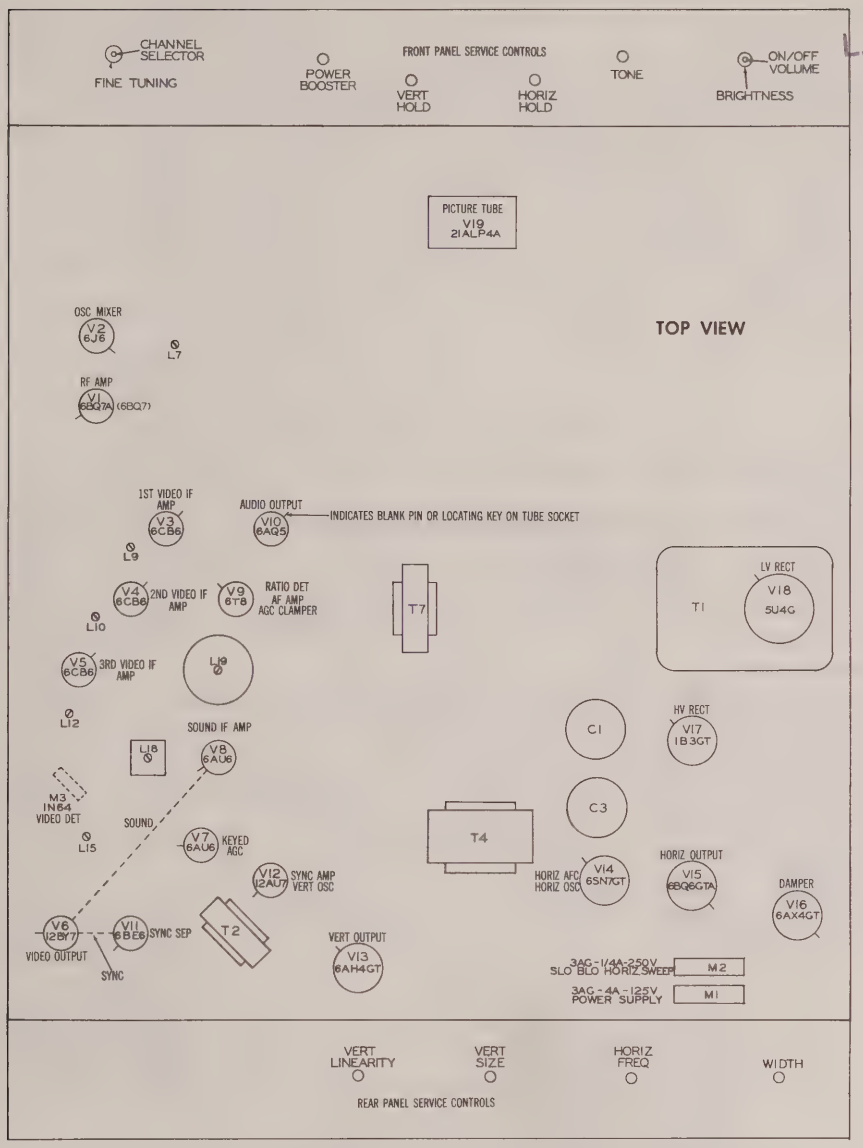


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V18, Fuse (M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V10**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V19**
Has pic, no sound - **V8, V9, V10**
Overloaded picture - **V7, V9**

SYNC FAILURE
No vert. sync - **V12**
No horiz. sync - **V12, V14**
No vert. or horiz. sync - **V11, V12**

SWEEP FAILURE
No raster, has sound - **V14, V15, V16, V17, V19, Fuse (M1)**
No vertical deflection - **V12, V13**
Poor vert. linearity or foldover - **V12, V13**
Poor horiz. linearity or foldover - **V14, V15, V16**
Narrow picture - **V14, V15, V16, V17, V18**
Vert. off freq. - **V12**
Horiz. off freq. - **V12, V14**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If picture tube is removed from the set the high lead should be securely taped and kept away from chassis. Do not remove the horizontal oscillator tube (V14) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with a 6J6 which has pin 1 clipped off. This will disable the local oscillator and reduce the possibility of erroneous indications. This may also be done by placing a strip of transparent cellulose tape on the first two contacts from front of tuner assembly. Use any unused channel strip and rotate drum to this insulated position. Connect the negative lead of a 3 volt battery to the ungrounded side of C47. Connect the positive lead to chassis. If the IF stages are badly misaligned, they may break into oscillation. This will be indicated by excessive deflection on VTVM. Also, the voltage due to IF oscillation will be affected by signal strength from the generator.
When and if oscillation occurs, it may be eliminated by detuning the IF coils in different directions or increasing the bias voltage to 4.5 volts. If increased bias is used during alignment, check to see if the IF channel is stable with reduced bias.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over dummy converter tube. Low side to chassis.	23.5MC	Any	DC probe thru 10KΩ to point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	"	"	"	A2	"
3.	"	"	25.9MC	"	"	A3	"
4.	"	"	"	"	"	A4	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
Adjust attenuator on sweep generator for VTVM reading of 1 volt. Set attenuator on marker generator so as not to distort waveform on scope.
Connect a .001MFD capacitor across the vertical amplifier input terminals of oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.5MC 26.0MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig.1. If necessary, retouch A1 thru A4 to obtain desired response. If sound marker (21.25MC) cannot be seen, increase sweep generator output. Replace the original 6J6 in its socket.

TUNER ALIGNMENT

The channel oscillator adjustment screws are reached through a hole to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the bias battery as in "Video IF Alignment".
Connect a .001MFD capacitor across the vertical input terminals of the oscilloscope.
Before oscillator alignment of tuner is attempted, be sure IF alignment is correct.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

RF AND MIXER ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. of scope to point (B). Low side to chassis.	A5, A6, A7	Adjust for response similar to Fig. 2. Adjust A5 and A6 to obtain correct amplitude of picture and sound carrier markers. Adjust A7 to equalize the overall amplitude. Do not overly broaden the curve as it will result in loss of sensitivity.
7.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A5, A6 and A7 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

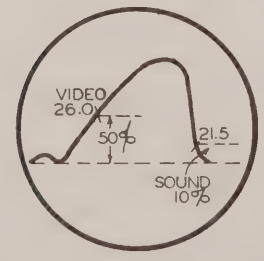


FIG.1

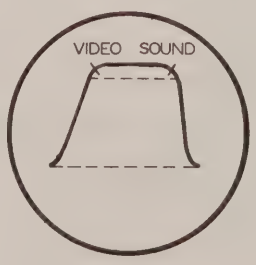


FIG.2

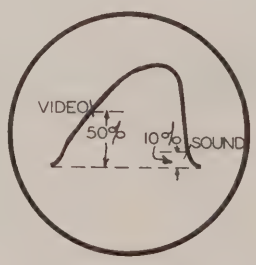


FIG.3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point (A). Low side to chassis. (Connect VTVM across vert. input terminals of scope)	A8	Attenuate sweep generator output to maintain not more than .5 volts at VTVM. Adjust to place video marker at 50% on response curve with sound carrier marker as in Fig. 3.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A9	
			207MC (10MC Swp)	205.25MC 209.75MC	12		A10	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A11	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A12	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A13	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A14	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A15	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A16	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A17	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A18	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A19	

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Set power booster control (R5) fully counter clockwise.
Connect two matched 100KΩ (±1%) resistors in series from point (C) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point (C). Low side to chassis.	A20, A21	Remove V5 from its socket. Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point (E). Common to point (D).	A22	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V5 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Set power booster control (R5) fully counter clockwise.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 10KΩ to point (C). Low side to chassis.	A20, A21	Remove V5 from its socket. Disconnect stabilizing capacitor C5. Adjust for response curve of maximum amplitude and symmetry similar to Fig. 4.
10.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A22	Reconnect stabilizing capacitor C5. Adjust A22 so that 4.5MC occurs at center of crossover lines as in Fig. 5. Slightly retouch A21 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Set power booster control (R5) fully clockwise. Remove V5 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe thru detector (Fig. 6) to pin 11 (cathode) of picture tube. Common to chassis.	A23	Adjust for MINIMUM deflection. Replace V5 in its socket.

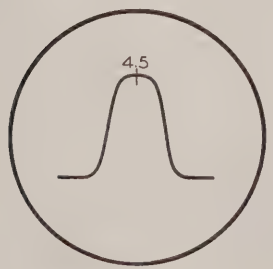


FIG. 4

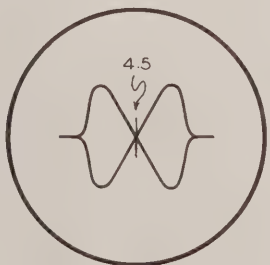


FIG. 5

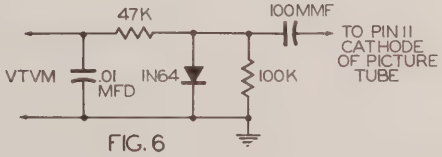
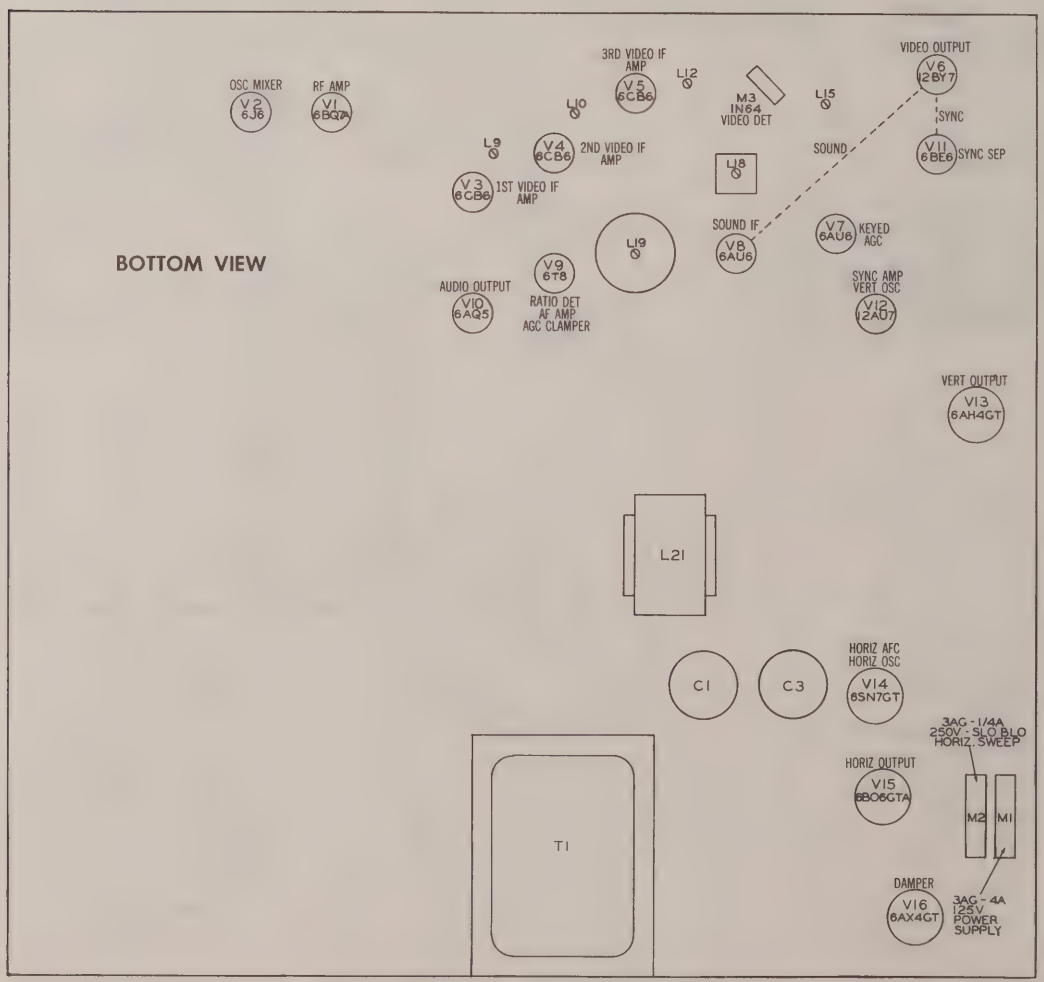


FIG. 6

RESISTANCE MEASUREMENTS

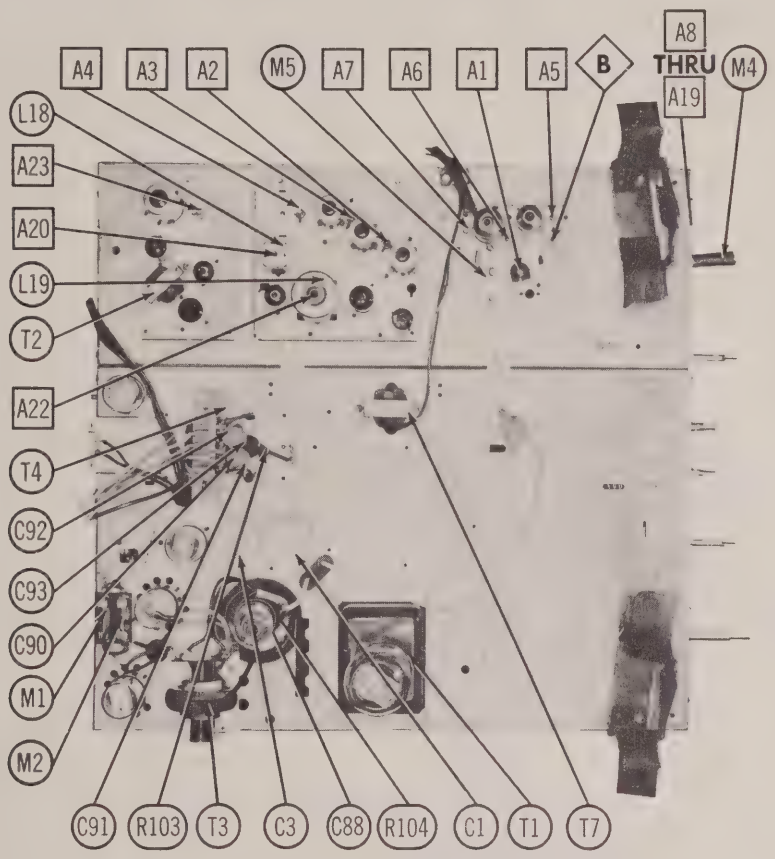
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	700KΩ	0Ω	.1Ω	0Ω	†6.7KΩ	190KΩ	INF	0Ω
V 2	6J6	■15KΩ	■100Ω	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	230KΩ	68Ω	.1Ω	0Ω	▲470Ω	▲470Ω	0Ω		
V 4	6CB6	70KΩ	70KΩ	150KΩ	150KΩ	†600Ω	†600Ω	70KΩ		
V 5	6CB6	.4Ω	180Ω	.1Ω	0Ω	■100Ω	■100Ω	0Ω		
V 6	12BY7	70Ω	3.3KΩ	70Ω	0Ω	0Ω	.1Ω	†20KΩ	■8.2KΩ	70Ω
V 7	6AU6	†45KΩ	10KΩ	150KΩ	150KΩ	320KΩ	†500Ω	10KΩ		
V 8	6AU6	.9Ω	0Ω	.1Ω	0Ω	■1KΩ	■1KΩ	120Ω		
V 9	6T8	INF	22KΩ	INF	0Ω	.1Ω	650KΩ	0Ω	10Meg	■470KΩ
V 10	6AQ5	370KΩ	40KΩ	150KΩ	150KΩ	†1KΩ	†700Ω	370KΩ		
V 11	6BE6	2.7Meg	0Ω	.1Ω	0Ω	■60KΩ	■82KΩ	2.2Meg		
V 12	12AU7	▲2.2Meg	2.5Meg	0Ω	0Ω	0Ω	†9KΩ	10Meg	40KΩ	.1Ω
V 13	6AH4GT	2.2Meg	0Ω	TP	TP	†800Ω	TP	.1Ω	1.3KΩ	
V 14	6SN7GT	1.5Meg	†60KΩ	430KΩ	500KΩ	†48KΩ	0Ω	.1Ω	0Ω	
V 15	6BQ6GTA	TP	.1Ω	TP	†10.5KΩ	470KΩ	TP	0Ω	100Ω	TOP CAP ▲18Ω
V 16	6AX4GT	NC	TP	1.2Meg	TP	†700Ω	TP	150KΩ	150KΩ	
V 17	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲318Ω
V 18	5U4G	INF	40KΩ	INF	37Ω	INF	39Ω	INF	40KΩ	
V 19	21ALP4A	150KΩ	†1.2Meg	PIN 6 0Ω	PIN 10 ▲33KΩ	PIN 11 †120KΩ	PIN 12 150KΩ			

†MEASURED FROM PIN 8 OF V18.
■MEASURED FROM 120V LINE.
▲MEASURED FROM PIN 7 OF V4.
▲MEASURED FROM PIN 3 OF V16.
TP-TIE POINT.
NC-NO CONNECTION.

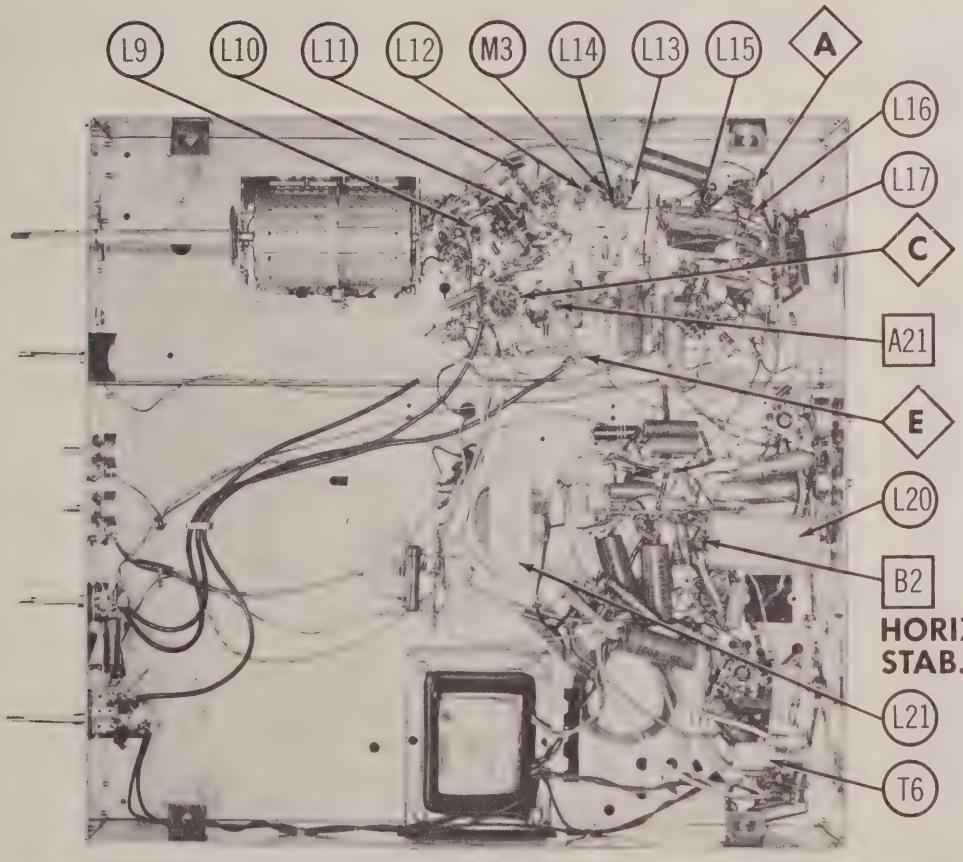


TUBE PLACEMENT CHART

L. F. ELAVKER
3924 MEADE ST.
DENVER, COLORADO



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Stewart-Warner Part No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	5BQ7A	6BQ7A	9AJ	5BQ7 used as an alternate
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12AV7	12AV7	9AF	
V7	AGC Keying	6AU6	6AU6	7BK	
V8	Sound IF	6AU6	6AU6	7BK	
V9	Ratio Detector-AF Amp.-AGC Clamper	6T8	6T8	7DK	
V10	Audio Output	6AQ5	6AQ5	7BZ	
V11	Sync Separator	6BE6	6BE6	7CH	
V12	Sync Amplifier-Vert. Oscillator	12AU7	12AU7	9A	
V13	Vert. Output	6AH4GT	6AH4GT	8KL	
V14	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V15	Horiz. Output	6BQ6GTA	6BQ6GTA	8AM	
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	5C	
V18	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: Stewart-Warner Part No.	C&S	GENERAL ELECTRIC	SYLVANIA	WESTINGHOUSE	RETMA BASE TYPE	NOTES
V19	21ALP4A ①	21ALP4A ① 21ALP4	21ALP4A ①	21ALP4A ② 21ALP4	21ALP4A ① 21ALP4	12L	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: Stewart-Warner Part No.	MALLORY Part No.	PYRAMID Part No.	SANGAMO Part No.	NOTES
C1A	⌀40	450	508072	FP377	TM-T40-450	T-170	
B	⌀40	450					
C	⌀40	450					
C2	40	300	180088	TC78	TD-40-350	FM-4540	
C3A	⌀80	250	509003	FP239.8	TM-3087	T-730	
B	⌀100	50					
C4	4	450	504718	TC70	TD-4-450	FM-4504	
C5	10	150	505174	TC42	TD-10-150	FM-1512	
C6	4	450	504719	TC70	TD-4-450	FM-4504	
C7	4	450	504719	TC70	TD-4-450	FM-4504	
C8	4	450	504719	TC70	TD-4-450	FM-4504	
C9	3-9		509004	S29-10			
C10	800						
C11	3		513453	TCZ-3R3	NP0A-030	ZT-353	
C12	5-3		507988	S29-3	S15-01-0R5	CT565A	
C13	800						
C14	47		520719	DD-470	831-470	UC-5447	
C15	1.5		520720	TCZ-1R5	NP0A-1R5	ZT-5515	
C16	1000		520735	DD-102	801-001	DC-531	
C17	800						
C18	47		520719	DD-470	831-470	UC-5447	
C19	5-3		507988	S29-3	S15-01-0R5	CT565A	
C20	10		520718	TCZ-10	NP0K-100	ZT-541	
C21	5		520717				
C22	1000		520735	DD-102	801-001	DC-531	
C23	6.8		520726	TCZ-6R8	NP0A-6R8	ZT-5568	
C24	120		513029	DD-121	831-121	UC-5313	
C25	800						
C26	800						
C27	5000		513013	DD-502	811-005	DC-525	
C28	5000		513013	DD-502	811-005	DC-525	
C29	5000		513013	DD-502	811-005	DC-525	
C30	5000		513013	DD-502	811-005	DC-525	
C31	5000		513013	DD-502	811-005	DC-525	
C32	5000		513013	DD-502	811-005	DC-525	
C33	5000		513013	DD-502	811-005	DC-525	
C34	5000		513013	DD-502	811-005	DC-525	
C35	5000		513013	DD-502	811-005	DC-525	
C36	5000		513013	DD-502	811-005	DC-525	
C37	5000		513013	DD-502	811-005	DC-525	
C38	5000		513013	DD-502	811-005	DC-525	
C39	5000		513013	DD-502	811-005	DC-525	
C40	5		513432	TCZ-5R1	NP0A-050	ZT-555	
C41	.22	200	512338		PT4023	DC-535	
C42	.47		513438	TCZ-47	NP0-338-470	ZT-5447	
C43	.1	200	512336	DF-104		PT401	
C44	.047	200	512335	DF-503		PT4147	
C45	.022	600	512334	DF-203	6YF-02	PT8123	
C46	220	1000	513032	DD-221	1R5KV-221	DC30232	
C47	.47	300	512339			PT4047	
C48	.22	400	512338			PT4023	
C49	2.2		513001	TCZ-2R2	NP0A-2R2		
C50	5000		513013	DD-502	811-005	DC-525	
C51	5000		513013	DD-502	811-005	DC-525	
C52	1500		513010	DD-152	801-0015	DC-5215	
C53	1500		513010	DD-152	801-0015	DC-5215	
C54	5000		513013	DD-502	811-005	DC-525	
C55	.047	200	512335	DF-503		PT4147	
C56	5000		513013	DD-502	811-005	DC-525	
C57	5000		513013	DD-502	811-005	DC-525	
C58	270		513006	D8-271	GP3K-271	UC-5327	
C59	.01	400	512205	D6-103	GP3-333-103	PT411	
C60	.01	400	512205	D6-103	GP3-333-103	PT411	
C61	5000		513013	DD-502	811-005	DC-525	Note 1
C62	5000		513013	DD-502	811-005	DC-525	
C63	.047	200	512335	DF-503		PT4147	
C64	.47	200	512339			PT4047	
C65	.01	400	512205	D6-103	GP3-333-103	PT411	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: Stewart-Warner Part No.	CENTRALAB Part No.	ERIE Part No.	MALLORY Part No.	NOTES
C66A	10000					DC-511	
B	20000		±508068	*PC-100	*1401-01	DC-522	
C	5000			DD-103	811-103	DC-525	
D	5000					DC-525	
C67	4700	1000	512533				
C68	.047	400	512336	DF-503		PT4147	
C69	.033	300	512310	DF-303		PT4123	
C70	.1	300	512316	DF-104		PT401	
C71	.1	600	512318	DF-104		PT601	
C72	100	500	512502	D8-101	801-101	MC2535	
C73	47	1000	513030	DD-470	1R5KV-470	DC30447	
C74	47	1000	513030	DD-470	1R5KV-470	DC30447	
C75	.0022	400	512332	D6-222	GP2-333-222	PT8222	
C76	.047	400	512336	DF-503		PT4147	
C77	.023	400	512333	DF-203	6H7-03	PT4123	
C78	.5	300	512339			PT406	
C79	.047	300	512335	DF-503		PT4147	
C80	200	500	513550	TCZ-200	NP0-334-201	MC2337	
C81	.01	400	512311				
C82	500					MC2351	Note 2
C83	13000		513008	D6-103	GP3L-102	UC-521	
C84	47		513438	TCZ-47	NP0-338-470	ZT-5447	
C85	.1	800	512318	DF-104		PT801	
C86	.25	600	512324			PT6025	
C87	.25	600	512324			PT6025	
C88	500	20000	520990	TV3-502	413	HV20035A	
C89	.25	600	512324			PT6025	
C90	180	3000		D330-181	6KV-181		Note 3
C91	180	3000		D330-181	6KV-181		Note 3
C92	180	3000		D330-181	6YK-181		Note 3
C93	180	3000		D330-181	6KV-181		Note 3
C94	.047	600	512337	DF-503		PT8147	

* Items C66A, C66B, C66C, C66D, R69A, R69B, R69C are combined in one unit.
* Connect 10000MMF unit in series with capacitor-resistor unit-input lead to replace original Mfgr. unit.
Note 1. Not used in some versions.
Note 2. Some versions use 530MMF in this application (part #513547).
Note 3. Some versions use 150MMF in this application (part #513549).

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: Stewart-Warner Part No.	CENTRALAB Part No.	CLAROSTAT Part No.	IRC Part No.	MALLORY Part No.	INSTALLATION NOTES
R1A	100KΩ	½	521080	F1-31	TRV-425	QJ-471*	UF1BL	Brightness (Panel)
B	1Meg	½		R2-57			URUGT25 †	Volume (Rear) Tap at 200KΩ
C	Switch			KB-1			US-26	Attach to R1B.
R2A	500KΩ	½	520746	AB-59	A47-500K-S	Q11-123	U-50	Tone
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A.
R3A	50KΩ	½	521059	AB-31	A47-50K-S	Q11-122	U-25	Horizontal Hold
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R3A.
R4A	1Meg	½	521038	AB-69	A47-1Meg-S	Q11-127	U-34	Vertical Hold
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R4A.
R5A	750Ω	2	522934	V-128	A43-750		R1000L	Power Booster (Wire Wound)
B	Shaft		Not Req.	AK-16	KSS-3		DS-26	Attach to R5A.
R6A	500KΩ	½	520945	AB-12	A47-500K-S	Q17-114	U-14	Vertical Linearity
B	Shaft		Not Req.	AK-1	FKS-1/4	Not Req.	Not Req.	Attach to R6A.
R7A	2.2Meg	½	520944	AB-83	A47-2.2Meg-S	Q11-233	U-565	Vertical Size
B	Shaft		Not Req.	AK-1	FKS-1/4	Not Req.	Not Req.	Attach to R7A.

*CONCENTRIKIT EQUIVALENT; K-2 KIT, BASE ELEMENTS AND SHAFTS; B11-126, P1-123 (Panel)
B13-137X, R1-218 (Rear)
76-1 Switch

† Universal Replacement (Mallory Exact Duplicate Part No. UL2420)

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: Stewart-Warner Part No.	IRC Part No.	NOTES
R8	15KΩ	½	510157		
R9	47KΩ	½	510167		
R10	100KΩ	½	510178	BTS-100K	
R11	160KΩ	½	510794		
R12	100KΩ	½	510781		
R13	150KΩ	½	510139	BTS-150Ω	
R14	10KΩ	½	510154	BTS-10K	
R15	15KΩ	½	510157		
R16	10KΩ	½	510154		
R17	220KΩ	½	510179		
R18	100Ω	½	510118	BTS-100	
R19	4700Ω	2	510348	BTB-4700	
R20	10KΩ	½	510154		
R21	470Ω	½	510130	BTS-470	
R22	68Ω	½	510116	BTS-68	
R23	100KΩ	½	510173		
R24	120KΩ	½	510174		
R25	10KΩ	½	510150		
R26	100Ω	½	510118	BTS-100	
R27	5600Ω	½	510150		
R28	470Ω	½	510132	BTS-47	
R29	6800Ω	½	510161		
R30	100Ω	½	510118	BTS-100	
R31	180Ω	½	510123	BTS-180	
R32	3300Ω	½	510145		
R33	47KΩ	½	510168	BTS-47K	
R34	8200Ω	½	510153		
R35	3300Ω	½	510145		
R36	10Meg	½	510187	BTS-10Meg	
R37	1Meg	½	510190		
R38	22KΩ	½	510172		
R39	33KΩ	½	510163		
R40	100KΩ	½	510174		
R41	560KΩ	½	510186		
R42	3900Ω	1	510247		
R43	1MΩ	½	510192		
R44	33KΩ	½	510163	BTS-33K	
R45	100KΩ	½	510172	BTS-100K	
R46	270KΩ	½	510178	BTS-220K	
R47	18KΩ	½	510159	BTS-18K	
R48	100KΩ	½	510236	BTS-1000	
R49	120Ω	½	510120	BTS-120	
R50	220Ω	½	510124	BTS-220	
R51	22KΩ	½	510180	BTS-22K	
R52	330KΩ	½	510181	BTS-330K	
R53	220Ω	½	510124	BTS-220	
R54	18KΩ	½	510159	BTS-18K	
R55	68KΩ	½	510169	BTS-68K	
R56	10Meg	½	510197	BTS-10Meg	
R57	470KΩ	½	510184	BTS-470K	
R58	560KΩ 5%	½	510715	BTS-560K 5%	
R59	820KΩ 5%	½	510747	BTS-820K 5%	
R60	18KΩ	½	510159		
R61	2.2Meg	½	510193		
R62	2.7Meg 5%	½	510772		
R63	82KΩ	½	510171		
R64	22KΩ	½	510160		
R65	220KΩ	½	510178	BTS-220K	
R66	10Meg	½	510197		
R67	22KΩ	½	510160		
R68	18KΩ	½	510159		
R69A	23KΩ				
B	8200Ω		±508068		
C	5200Ω				
R70	1.2Meg 5%	½	510777		
R71	220KΩ	½	510178	BTS-220K	
R72	470KΩ	½	510184	BTS-470K	
R73	33Ω	½	510161		
R74	68KΩ	½	510188	BTS-68K	
R75	8200Ω	½	510153		
R76	47KΩ	½	510168	BTS-47K	
R77	2.2Meg	½	510193		
R78	39Ω	½	510139		
R79	6800Ω	½	510132		
R80	56Ω	½	510123		
R81	47KΩ	1	510248		
R82	68KΩ	½	510251		
R83	330KΩ	½	510181		
R84	68KΩ	½	510169	BTS-68K	
R85	56KΩ	½	510168	BTS-820K	
R86	820KΩ	½	510169	BTS-100K	
R87	100KΩ	½	510172		
R88	470Ω	½	510148	BTA-330K	
R89	330KΩ	1	510281		
R90	150KΩ	½	510175		
R91	10KΩ	½	510154		
R92	18KΩ	½	510159		
R93	230KΩ	½	510178	BTS-220K	
R94	150KΩ	½	510175		
R95	1Meg	½	510190		
R96	10KΩ	1	510154		
R97	47KΩ	1	510286		

RESISTORS (cont)

ITEM No	RATING: OHMS	WATT	REPLACEMENT DATA: Stewart-Warner Part No.	IRC Part No.	NOTES
R98	220KΩ	½	510178	BTS-220K	
R99	470KΩ	½	510184		
R100	10KΩ	2	510334		
R101	100Ω	2	510318		
R102	200Ω	5	510795	1 3/4A-200	
R103	470Ω	1	510248		
R104	1Meg	½	510190		

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: Stewart-Warner Part No.	IRC Part No.	NOTES
R105	100KΩ	½	510172	BTS-100K	
R106	50Ω	5	510782	1 3/4A-50	
R107	600Ω	10	510741	1 3/4A-600	
R108	1500Ω	½	510139	BTS-1500	
R109	15KΩ	2	510357	BTB 15K	
R110	400Ω	10	510739	1 3/4A-400	
R111	150KΩ	½	510175	BTS-150K	

* Items C66A, C66B, C66C, C66D, R69A, R69B, R69C are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING: PRI	SEC 1	SEC 2	Stewart-Warner Part No.	Halldorson Part No.	Merit Part No.	RCA TYPE No	Stancor Part No.	Thordarson Part No.	Triad Part No.
T1	117VAC ①1.54A	680VCT 190ADC	5VAC ② 3A	520961		P-3239 ①				
	SEC 3	SEC 4	SEC 5							
	6.3VAC ② 6A	12.6VCT ③ 3A								

① Series two 6.3VⓋ 5.5A windings for Sec. 4, tape 6.3V Ⓒ . 85A winding, mount on top of chassis.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	Stewart-Warner Part No	Halldorson Part No	Merit Part No	RCA TYPE No	Ram Part No	Stancor Part No	Thordarson Part No	Triad Part No
T2	Vert.Osc.Trans.	520980	B6702	A-3003	209T1 ①	V403	A-8125	26A03	A-97X
T3	Horiz.Output Trans.	522978	F3618 ⑦	HVO-98 ⑦	23S71 ⑦	X-2094 ⑦	A-8253 ⑦	P1Y-18 ⑦	D-10 ⑦
T4	Vert.Output Trans.	523087 ②		1				1	
T5A	Yoke(90°) Horiz. (26.5MH)	520875 ③	A-3036 ④			V305 ④	A-8143 ④	26S53 ④	A-98X ④
B	Vert.(36MH)	512887 ⑤	DF60T ⑤	MDF-92 ⑤ ⑦	23SD1 ⑤		DY-18A ⑤	Y-18 ⑤	Y-41-1 ⑤
T6	Width Coil (4-34MH) AFC Secondary (3.5-11MH)	508667 ⑦	RF800 ⑥ ⑦	MWC-1 ⑥ ⑦	214R1 ⑥ ⑦	203H14 ⑥ ⑦	WC-5 ⑥ ⑦	WC-20 ⑥ ⑦	WC-1L ⑥ ⑦

① Drill new mounting hole(s).
② Alternate Stewart-Warner part number.
③ Includes connectors for yoke leads.
④ Connect as auto transformer.
⑤ Use .05 to 1 turns ratio.
⑥ Includes resistors R79 and R80. Rear cover and centering device (Stewart-Warner part number 531267).
⑦ Use original rear cover and centering device.
⑧ Use original horizontal yoke damping network.
⑨ Includes core and mounting clip. Stewart-Warner part #508784 (mounting clip only, part #504691).
⑩ Connect terminals #1 and #2 to transformer. Terminals #3 and #4 to AFC network.
⑪ If the picture is out of phase, reverse primary or secondary connections.
⑫ Connect red and blue terminals to transformer. Orange and black terminals to AFC network.
⑬ Connect terminals "C" and "E" to transformer. Terminals "A" and "B" to AFC network.
⑭ Connect inner winding to transformer. Terminals #1 and #2 to AFC network.
⑮ Connect terminals #3 and #4 to transformer. Terminals #1 and #2 to AFC network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
8	9	9	9	9	8	9	9
6	5	5	5	5	2	5	5
4	NC Note ⑯	NC Note ⑯	NC Note ⑯	NC Note ⑯	NC Note ⑯	NC Note ⑯	NC Note ⑯
3	3	3	3	3	3	3	3
2	1	1	1	4	1	1	
Connect Width Coil Across	3 & 2	3 & 1	3 & 1	3 & 1	3 & 4	3 & 1	3 & 1
Special Notes	⑯	⑯	⑯	⑯	⑯	⑯	⑯

⑯ Remove brown lead of yoke from terminal strip on vertical output transformer and connect to junction R103 and brown lead from horizontal output transformer (original terminal #4 lead)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	Stewart-Warner Part No.	Halldorson Part No.	Merit Part No.	Stancor Part No.	Thordarson Part No.	Triad Part No.	NOTES
T7	4.5KΩ	3.3Ω	509376	Z1107	A-3230	A-3877	22S46	S-3X	

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V C	IMP	Stewart-Warner Part No.	QUAM Part No.	NOTES
SP1	6"x 9"	PM	3.3Ω		508174 ①	6BA2	① Used in Models 21C-9700W, WB, X, XB
	8"	PM	3.3Ω		509398 ②	6A1	② Used in Models 21Y9700B and 21Y9700RB

COILS (RF-IF)

ITEM No.	USE	DC RES: PRI	SEC	Stewart-Warner Part No.	MEISSNER Part No	MERIT Part No	MILLER Part No	NOTES
L1A	Ant. Coil	00CT	0Ω	520702				Channel 2
B	Ant. Coil	00CT	0Ω	520703				Channel 3
C	Ant. Coil	00CT	0Ω	520704				Channel 4
D	Ant. Coil	00CT	0Ω	520705				Channel 5
E	Ant. Coil	00CT	0Ω	520706				Channel 6
F	Ant. Coil	00CT	0Ω	520707				Channel 7
G	Ant. Coil	00CT	0Ω	520708				Channel 8
H	Ant. Coil	00CT	0Ω	520709				Channel 9
I	Ant. Coil	00CT	0Ω	520710				Channel 10
J	Ant. Coil	00CT	0Ω	520711				Channel 11
K	Ant. Coil	00CT	0Ω	520712				Channel 12
L	Ant. Coil	00CT	0Ω	520713				Channel 13

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Stewart-Warner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L2	Fil. Choke	0Ω		520518				
L3	Neut. Coil	0Ω		520701				
L4A	RF, Mixer Grid, Osc. Coils	0Ω		520722				Channel 2
B	RF, Mixer Grid, Osc. Coils	0Ω		520723				Channel 3
C	RF, Mixer Grid, Osc. Coils	0Ω		520724				Channel 4
D	RF, Mixer Grid, Osc. Coils	0Ω		520725				Channel 5
E	RF, Mixer Grid, Osc. Coils	0Ω		520726				Channel 6
F	RF, Mixer Grid, Osc. Coils	0Ω		520727				Channel 7
G	RF, Mixer Grid, Osc. Coils	0Ω		520728				Channel 8
H	RF, Mixer Grid, Osc. Coils	0Ω		520729				Channel 9
I	RF, Mixer Grid, Osc. Coils	0Ω		520730				Channel 10
J	RF, Mixer Grid, Osc. Coils	0Ω		520731				Channel 11
K	RF, Mixer Grid, Osc. Coils	0Ω		520732				Channel 12
L	RF, Mixer Grid, Osc. Coils	0Ω		520733				Channel 13
L5	Fil. Choke	0Ω		520520				
L6	RF Coil	0Ω		520714				
L7	1st Video IF	1Ω		520734				Core Part No. 509062
L8	RF Choke	1.3Ω		520715				
L9	2nd Video IF	.3Ω	.4Ω	520977	17-1063	TV-116	6249	Core Part No. 507357
L10	3rd Video IF	.3Ω	.4Ω	520977	17-1064	TV-116	6250	Core Part No. 507357
L11	Fil. Choke	0Ω		507584	19-3001	TV-189	6175	.6 Microhenry
L12	4th Video IF	.5Ω	.6Ω	520979	17-1064	TV-116	6250	Core Part No. 507357
L13	Shunt Peaking Coil	10Ω		520689	19-3180	TV-184	6154	195 Microhenries
L14	Series Peaking Coil	8Ω		520984	19-3125		6153	120 Microhenries
L15	4.5MC Trap	1.6Ω		509603	20-1004	TV-151	1469	Core Part No. 507357
L16	Series Peaking Coil	10Ω		520689	19-3180	TV-184	6154	195 Microhenries
L17	Shunt Peaking Coil	11.5Ω		509341	19-3250	TV-185	6181	250 Microhenries
L18	Sound IF	.9Ω		509378	16-3445*	TV-113*	1470-A	
L19	Ratio Det.	3.8Ω	.8ΩCT	509706	17-3493	TV-115■	1498	Tertiary winding=.4Ω
L20	Horiz. Osc.	24Ω	60Ω	522519	20-1401▲	TV-161▲	6182▲	Core Part No. 521064 Waveform Winding=45Ω

* Use one winding only.
■ Use adaptor plate.
▲ Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA Stewart Warner PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L21	.190ADC	72Ω	2.9HY	508341	C5030	C-2991 ①	C-2325	26C44	C-17X

① Drill one new mounting hole.

FUSES

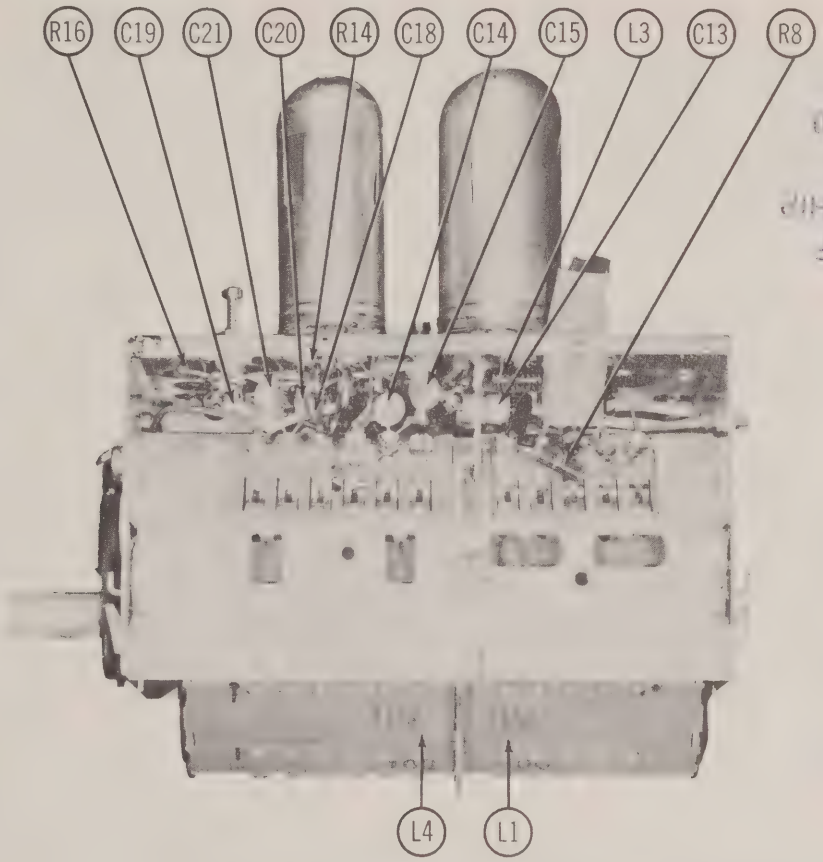
ITEM No.	TYPE	RATING	REPLACEMENT DATA Stewart Warner PART No. FUSE	Stewart Warner PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	1/4A 250V	508713		312.250 (3AG 1/4A)	357002	AGC 1/4	4408
M2	3AG S/B	4A 125V	521803		313004. (3AG S/B 4A)	357002	MDX4	4408

CRYSTAL DIODES

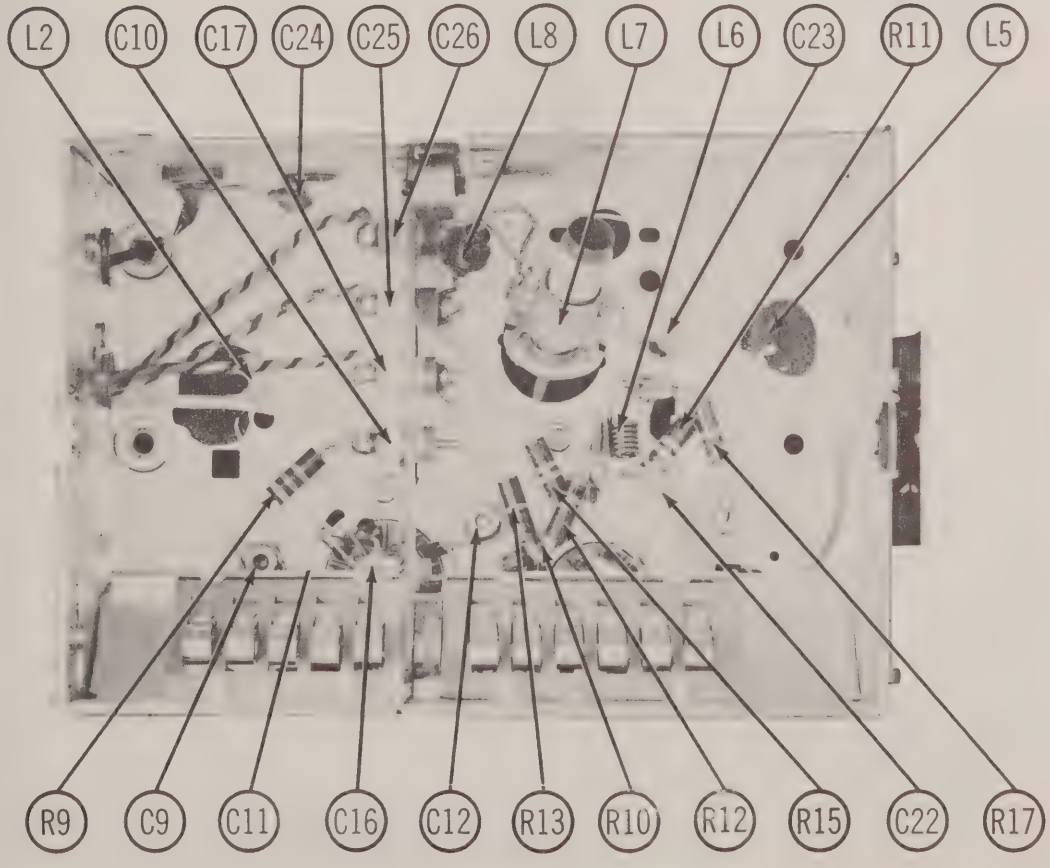
ITEM No.	ORIG. TYPE	REPLACEMENT DATA Stewart-Warner PART No.	REPLACEMENT DATA SYLVANIA PART No.	NOTES
M3	1N64	509386	1N60	Video Detector

MISCELLANEOUS

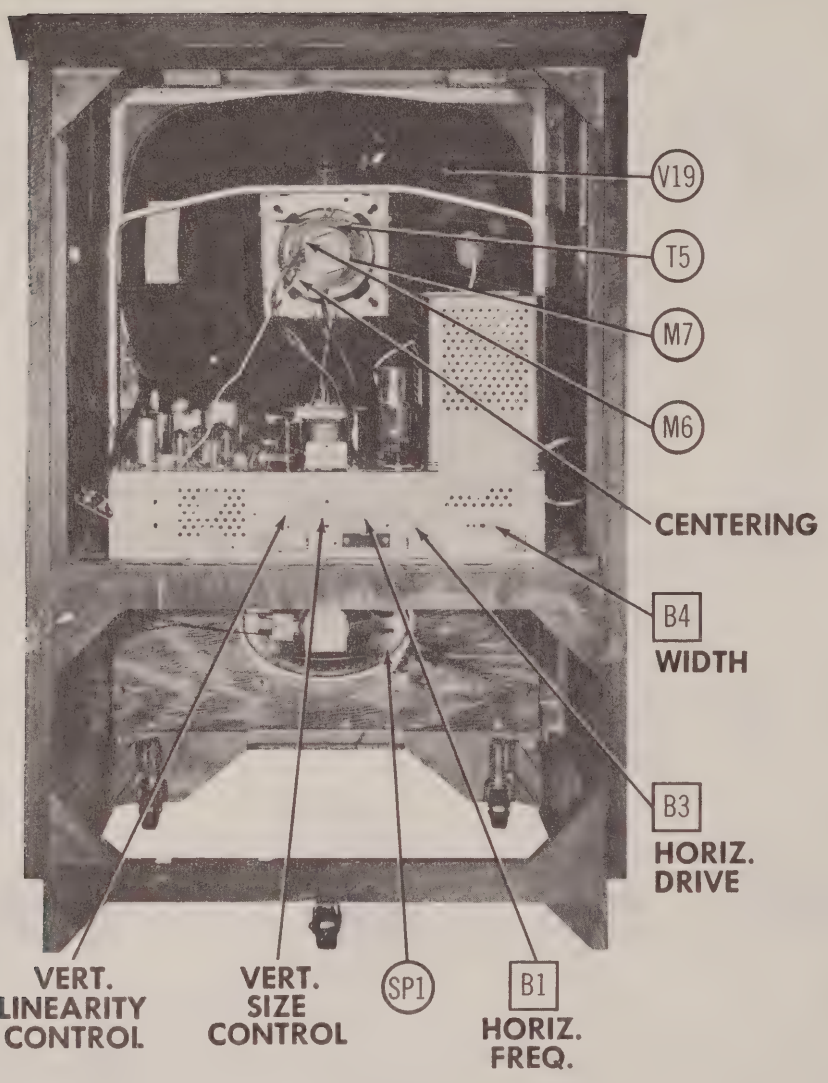
ITEM No.	PART NAME	Stewart Warner PART No.	NOTES
M4	Dial Light	118921	#47
M5	Tuner	521068	VHF
M6	Centering Device	521267	Includes yoke (T6) rear cover.
M7	Ion Trap	523085	
B3	Trimmer Cap.	508071	Horiz. Drive (10-160MMF)
	Cabinet	522361	Model 21C-9700X
	Cabinet	522362	Model 21C-9700XB
	Cabinet	522901	Model 21C-9700W
	Cabinet	522902	Model 21C-9700WB
	Cabinet	522981	Model 21T-9700R
	Cabinet	522982	Model 21T-9700RB
	Knob	509019	Brightness
	Knob	522354	Channel Selector
	Knob	509017	Fine Tuning
	Knob	509018	On-off-volume
	Knob	520740-D	Tone or power booster
	Knob	521134	Horiz. & Vert. Hold
	Safety Glass	522968	Models 21C-9700W, 21C-9700WB, 21T-9700R, 21T-9700RB
	Safety Glass	522756	Models 21C-9700X, 21C-9700XB
	Mask	522971	Models 21C-9700W, 21C-9700X, 21T-9700R
	Mask	522972	Models 21C-9700WB, 21C-9700XB, 21T-9700RB



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal frequency slug (B1) and the stabilizing coil slug (B2) all the way out.

2. Short together terminals "C" and "D" of L20.

3. Turn the horizontal drive trimmer (B3) one-half turn from its fully clockwise position. Set the horizontal hold control fully clockwise.

4. Adjust B1 until picture locks in horizontally.

5. Remove short from terminals "C" and "D" of L20. If picture loses sync with short removed, adjust B2 until picture locks in sync. Turn the horizontal hold control over its full range, the picture should stay locked in sync. If picture loses sync readjust B2.

6. Connect the vertical input lead of an oscilloscope to terminal "C" of L20. The broad and narrow peaks should be of equal amplitude as shown in Fig. 7. If necessary, slightly retouch B2 if peaks are not equal.

7. Remove scope from terminal "C" of L20.

8. With horizontal hold set at its mid-range position, picture should remain in sync while switching off channel and back again. Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of vertical white lines or compression near center of the screen.
Adjust the horizontal width slug (B4) for a picture slightly wider than necessary to fill the picture mask horizontally.

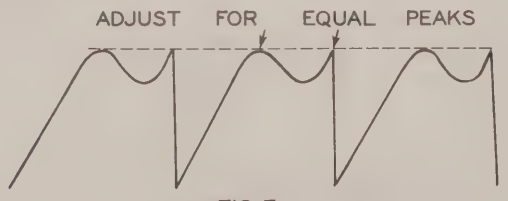


FIG. 7

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L. F. FLANNERSHIP
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DENVER, COLORADO

V-M
MODEL 954B

V-M
MODEL 954B

Figure 1

GENERAL INFORMATION

V-M Model 954B Tri-o-matic Record Changer is designed to play in automatic sequence a stack of records and shut off after playing of the last record.

As many as ten 12", twelve 10", or any assortment of 10" and 12" records (providing they are of the same speed and same type of groove) may be intermixed in any order.

A stack of twelve 7", 33 1/3 R. P. M. records or a stack of twelve 7", 45 R. P. M. records (with the use of a "45" Adaptor Spindle) will also play on this changer.

Record separation is accomplished by movement of a finger in the center spindle. This finger directly separates records having a 1/4" centerhole and actuates the knives and shelves of the centerpost used for the playing of 45 R. P. M. records having a 1 1/2" centerhole.

The tripping method used is the velocity type in which the trip link cause a trip pawl to engage a projection on the turntable hub and start the mechanism into cycle.

Connect this changer to an outlet supplying 117 volts, 60 cycle AC only, unless otherwise specified.

Manufactured by:
V-M Corporation
Benton Harbor, Michigan

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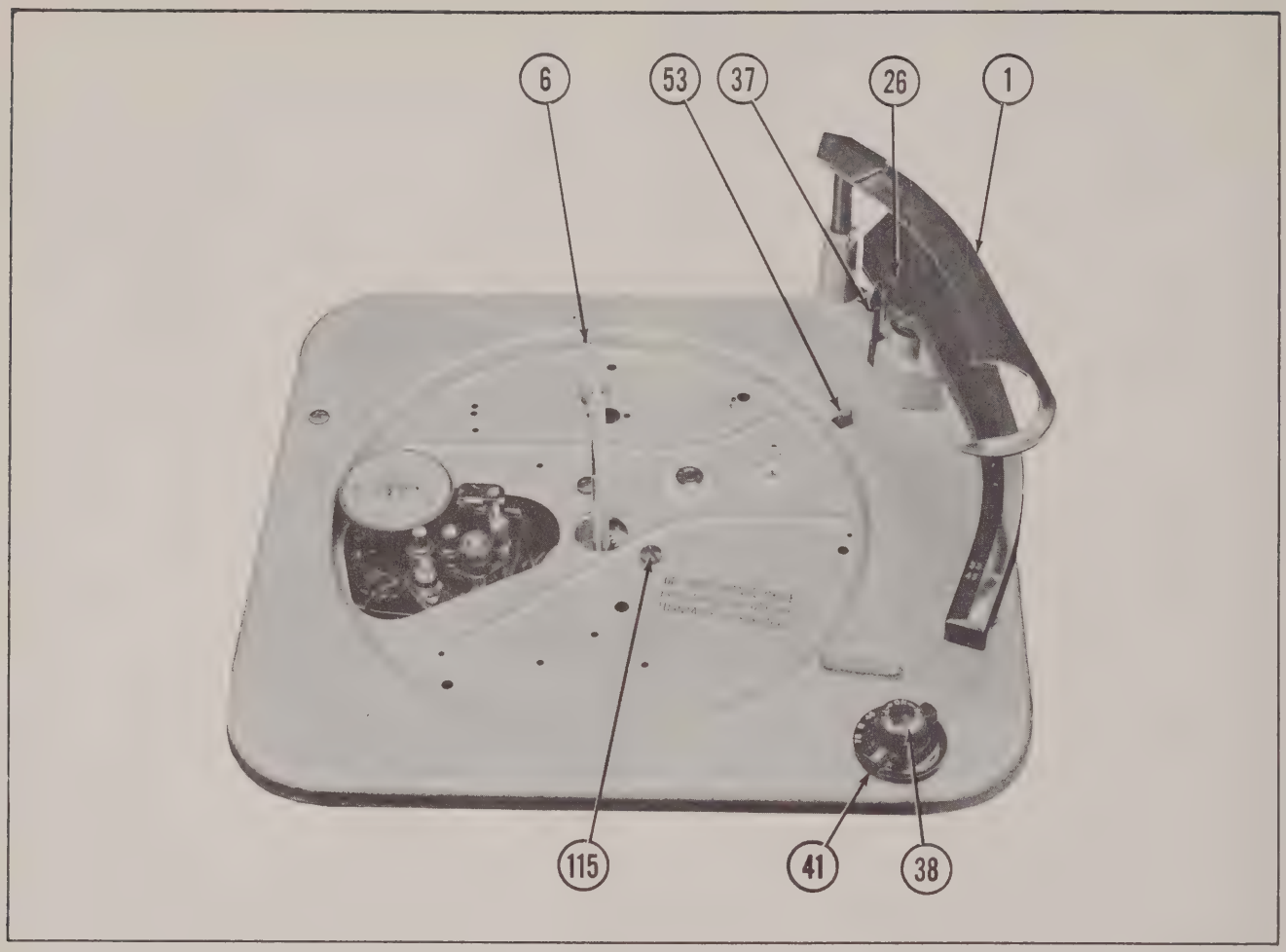


Figure 2

SPECIFICATION

Turntable Speed-

33 1/3, 45, or 78 r.p.m.

Record Capacity-

Up to 12 seven - inch records.
Up to 12 ten - inch records.
Up to 10 twelve - inch records.
Up to 10 twelve and ten inch records intermixed.

CONTROLS

Two controls are provided on the baseplate. Both controls are located on the right front corner, one being under the other control.

The upper control is the On-Off-Reject control . Turning this control to the "On" position energizes the motor and starts the turntable, when turned to the right (clockwise) to the "Rej". position it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this control to the left (counterclockwise).

The lower control is the speed control. It has three normal positions, "33 1/3", "45", and "78" to select the turntable speed desired. The control should be turned to the "N" position if the changer is not expected to be in use for an extended period of time .

PREPARING FOR OPERATION

Shipping Bolts—

Before placing in operation, the machine must be floated freely on the mounting springs. To float the changer, turn the two shipping bolts in a clockwise direction as far as they will go.

Leveling Record Changer—

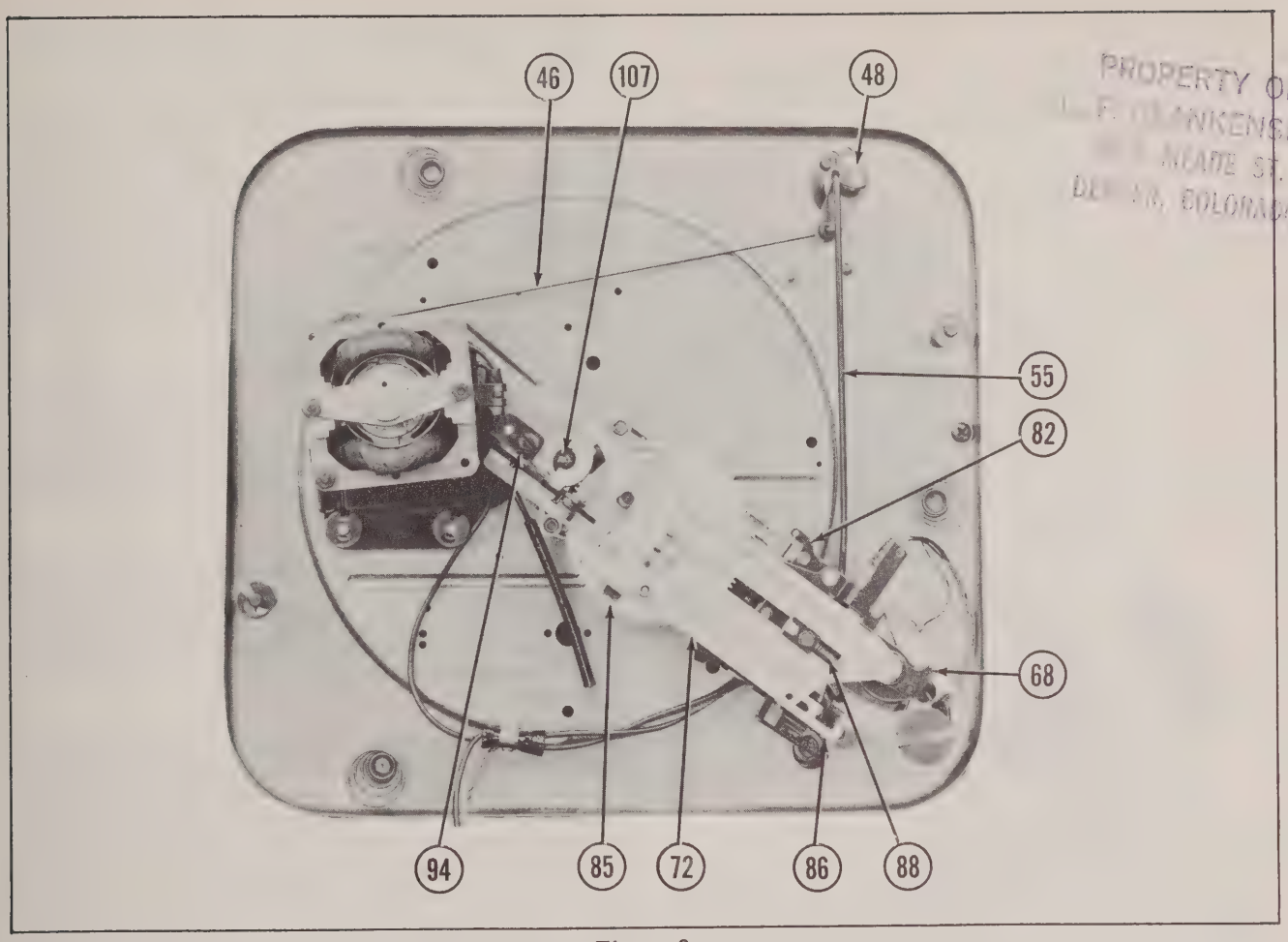
It is essential to have the record changer absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or combination cabinet to achieve perfect level.

OPERATING INSTRUCTIONS

Loading —

1. Pull straight up on record support knob (1A) until record support clears spindle, swing support out over pick-up arm.

2. Place records on spindle and lower to offset shelf. Hold records level and replace record support over spindle.



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DE...ER, COLORADO

Figure 3

Starting—

To start the machine, after checking that the stylus and speed controls are in the position corresponding to type records to be played, turn "Off - On - Rej." knob to "Rej." and release. The changer will operate automatically until the last record has been played, at which time, the pick-up arm is returned to its rest and the supply to the motor is switched off.

Rejecting—

To reject a record at any time while the changer is operating, turn "Off - On - Rej." knob to "Rej." and release.

Stopping-

The changer may be stopped any time a record is playing by turning changer control knob to "Off." Lift pick-up arm and place on rest.

Unloading—

Lift record support clear of spindle and swing out over pick-up arm. Using both hands, with fingers under the edge of bottom record, lift records straight up and off spindle.

Manual Operation—

Records that do not have starting and fast-finishing grooves must be played manually. To play records manually, lift the record support arm and swing to the right until clear of the turntable. Place record on spindle and lower to spindle shelf. Tilt record down toward left front of baseplate and lower to turntable. Turn changer control knob to "On" position only. Gently place needle on record.

Repeating Of 7", 10", Or 12" Records—

To repeat a record, swing record support clear of turntable, place record on turntable and start changer. Record repeats until control is turned "Off". If a 12" record is repeated, wait for the changer to finish cycling and reposition the pick-up arm manually to the 12" position.

CHANGE CYCLE

It is recommended that the change cycle operation be observed by rotating the turntable by hand. The action described below can then be readily followed and the function of each part more easily understood.

This changer is provided with what is known as velocity trip mechanism. The change cycle is started by the faster inward motion of the pick-up arm when the needle enters the trip grooves at the end of the record. Only records having fast-finishing grooves will operate this trip.

The pick-up arm and hinge assembly, and trip finger cam and shaft assembly (68) are secured together

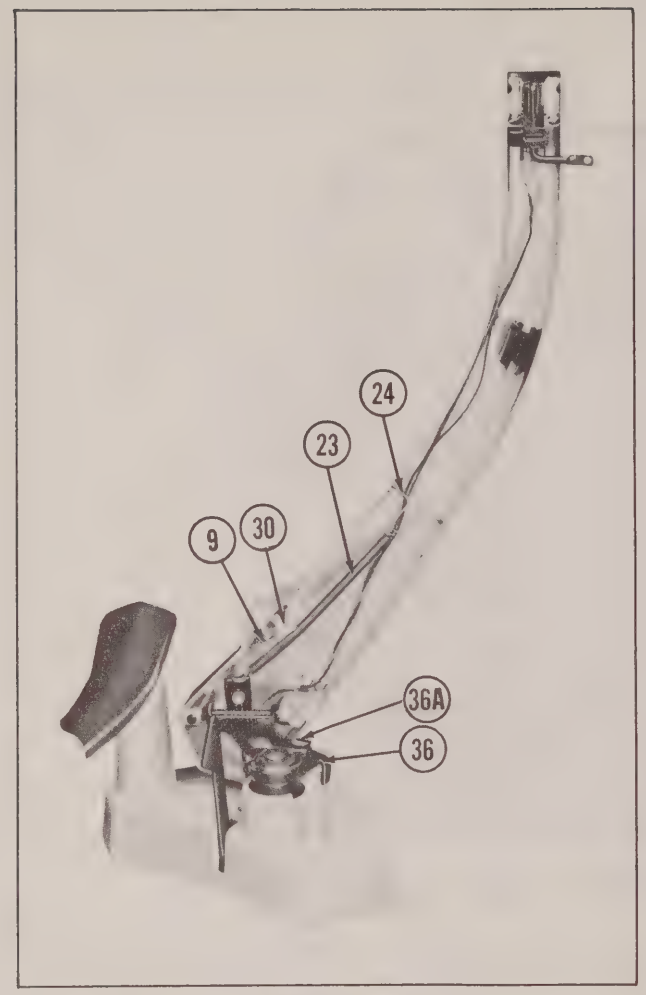
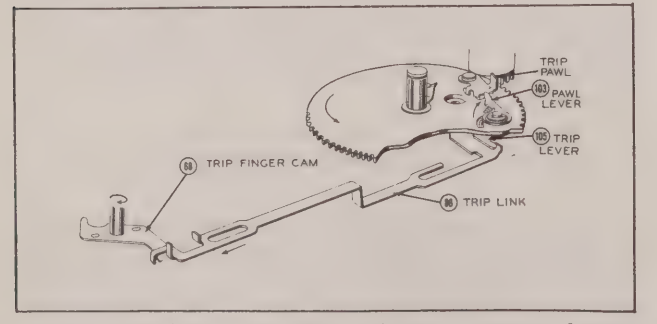


Figure 4

so that they move in unison. As the pick-up arm nears the end of a record, trip finger cam (68) pushes trip link (86), which, in turn, engages and pivots trip lever (105). As trip lever (105) pivots, pawl lever (103) pivots with it and carries the trip pawl toward the hub on the turntable. While a record is playing, the small motions of the trip pawl are not sufficient to cycle the mechanism because on each revolution of the turntable the wiping contact by the hub projection moves the trip pawl back to clear the projection.



In the first revolution of the turntable during which the pick-up arm advances rapidly, the trip pawl is moved far enough to definitely engage the projection on the turntable hub. The contact between the trip pawl and the turntable hub projection gives the necessary push for the teeth in main gear (85) to engage the teeth in the turntable hub, thus causing main gear (85) to rotate. This in turn, starts the lateral travel of the slide assembly (72). The slide assembly (72) moves to the rear thru the action of an eccentric mounted pin on main gear (85), which rides in the cross slot in the slide assembly (72).

As the slide assembly begins to move, the cam surface on the rear of the slide pushes lift pin (35) upward, raising the pick-up arm clear of the record . At the same time, trip finger cam (68) is pushed up by the force transferred through lift pin spring (70). The raising of trip finger cam (68) causes the two formed dimples in the trip finger cam to engage the two holes in the pick-up arm return locator (64), and couple them together. This directs the movement of the pick-up arm during the change cycle.

Slide assembly (72) continues to move away from the centerpost until the formed end of slide (72) pushes against the pick-up arm return locator (64). This relieves the force of pick-up arm return locator (64) against shut-off lever assembly (81), permitting shut-off lever spring (80) to return the shut-off lever (81) to the normal (raised) position.

After cycling slide (72) has raised the pick-up arm and is moving it outward, the tab on front of slide assembly (72) contacts the ejector bracket assembly (94). Ejector bracket (94) moves push rod (99) upward , actuating spindle assembly (6), to drop a record to the turntable.

Simultaneously, the trip pawl on top of main gear (85) contacts and rides along the curved finger of the muting switch bracket assembly (82). This action moves the trip pawl and its associated levers into a neutral position. This prevents the trip pawl from re-engaging with the projection on the turntable hub which would start a new change cycle.

At this time, the cam surface of the bracket located on top of main gear (85) moves reset lever (77) to its mid-position (10" set-down) where it is held by the 12" record selector (37). Slide assembly (72) continues to the rear and then starts forward.

If 7" records are being changed, the rubber bumper (53) on 7" set-down lever (74) is free to move upward. This action of 7" set-down lever (74) raises reset lever (77) to the upper position (7" set-down).

If 10" records are being changed, the 7" set-down lever (74) will not operate as the rubber bumper (53) will contact the edge of the 10" record and reset lever (77) will remain in the mid-position (10" set-down) as originally placed by the caming action of the bracket on top of main gear (85).

When a 12" record drops to the turntable, it strikes the 12" record selector (37) and forces it backward. This disengages the end of reset lever (77) from the edge of the 12" record selector (37) and permits the reset lever (77) to drop down into the recess at the bottom of the 12" record selector (37). This position of the reset lever (77) causes it to engage the bottom step of the pick-up arm return locator (64) and will push the pick-up arm to land on the edge of a 12" record.

As the slide assembly (72) continues forward, the tab on the rear of the slide moves clear of the pick-up arm return locator (64) and the trip finger cam (68), which are still locked together. This action permits the pick-up arm return spring (61) to move the pick-up arm inward until one of the three set-down

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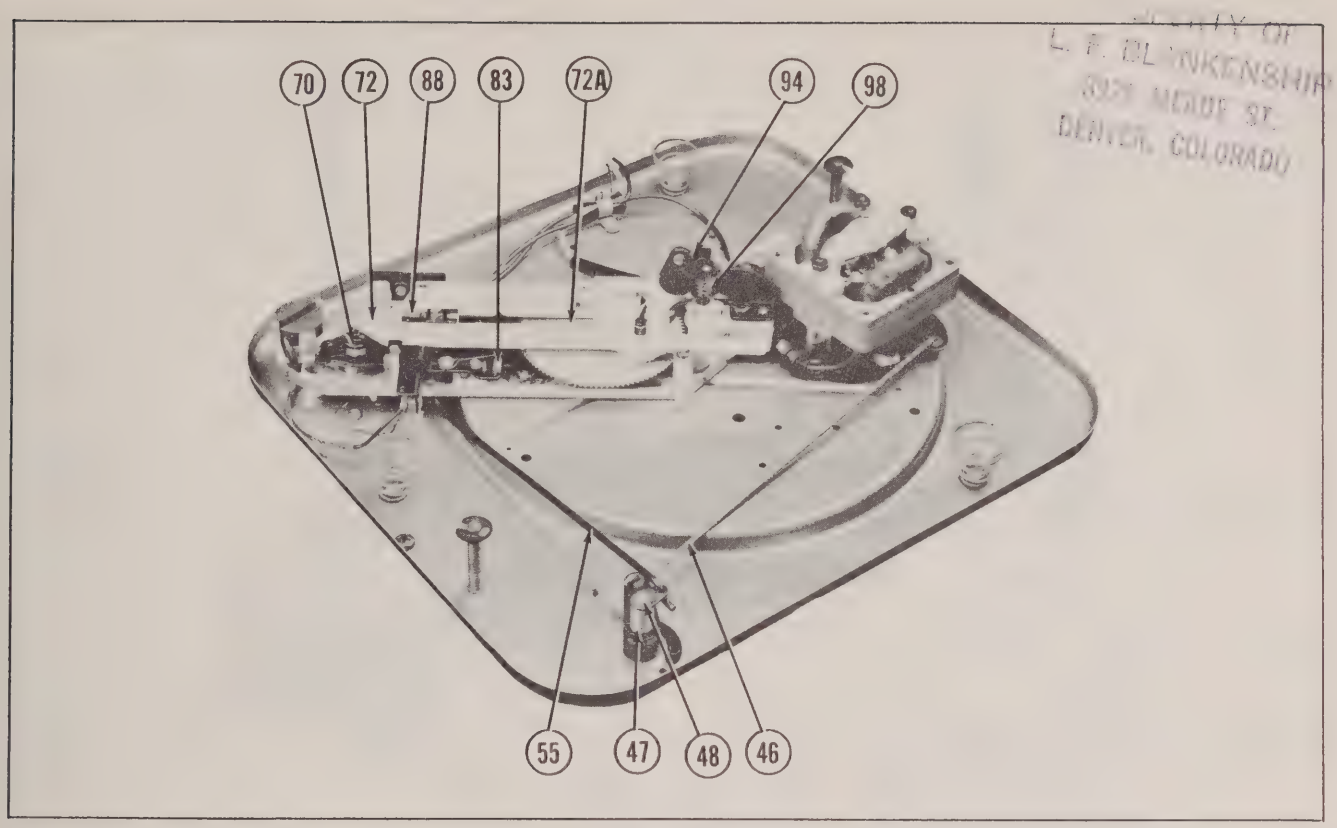

Figure 5

steps in the pick-up arm return locator (64) strike the reset lever (77), which has been positioned by the record being changed (see above). This stops the inward movement of the pick-up arm directly above the point of landing. The pick-up arm is then lowered to the lead-in groove of the record as the lift pin (35) rides down the incline on the rear of the slide assembly (72). As the pressure is released from lift pin spring (70), trip finger cam (68) and pick-up arm return locator (64) separate. This permits the pick-up arm to move freely across the record.

After the mechanism has been tripped it again follows the preceding sequence of cycling and playing the records until the last record of the stack has been played.

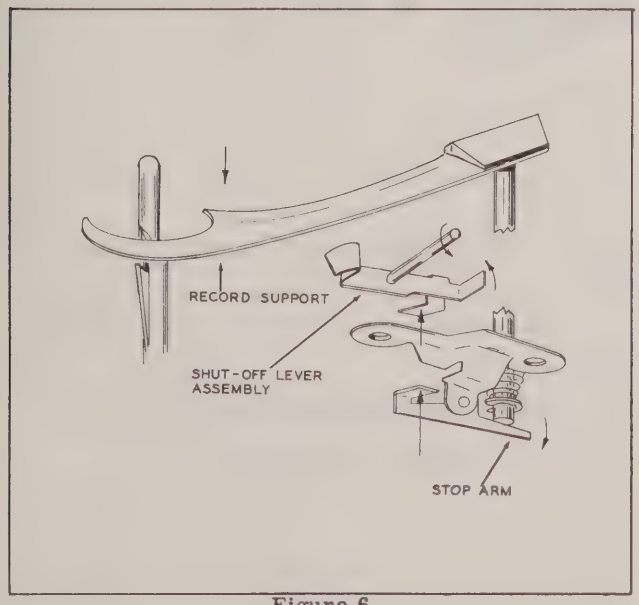

Figure 6

As the last record of the stack drops to the turntable the record support (1) drops below the shelf on the spindle assembly (6) and the lower end of record support shaft contacts the stop arm on the shut-off bracket assembly (51). This stop arm in turn applies force to shut-off lever (81). At this moment the cycling slide (72) is in the outermost position (away from centerpost) and the end of the shut-off lever (81) is forced against the escape lever (72A) which prevents it from lowering further. (See Figure 6).

As the cycling slide (72) returns to the out of cycle position the end of shut-off lever (81) slides off the escape lever (72A) permitting the end to extend down through the slot in the cycling slide. At this time the pick-up arm has rotated too far to be blocked by the other end of the shut-off lever (81) and the pick-up is permitted to land on the record.

After the last record has been played the mechanism again goes into change cycle, and the cycling slide (72) moves into its outermost position. At this moment the force which has been applied to the shut-off lever (81) from the record support shaft causes the end of shut-off lever (81) to lower, thus extending further through the slot in cycling slide (72). The other end of shut-off lever (81) raises and blocks the pick-up arm return locator (64) which at this moment is held back by the cycling slide (72).

As the cycling slide (72) moves back toward the centerpost, it carries the raised trip link(86) along until finally the formed end of the trip link (86) pushes control lever (59) which in turn actuates power switch (60). This removes power from the motor and the mechanism stops.

As the slide assembly moves to the out of cycle position, lift pin (35) rides down the incline and lowers the pick-up arm to the rest post (39).

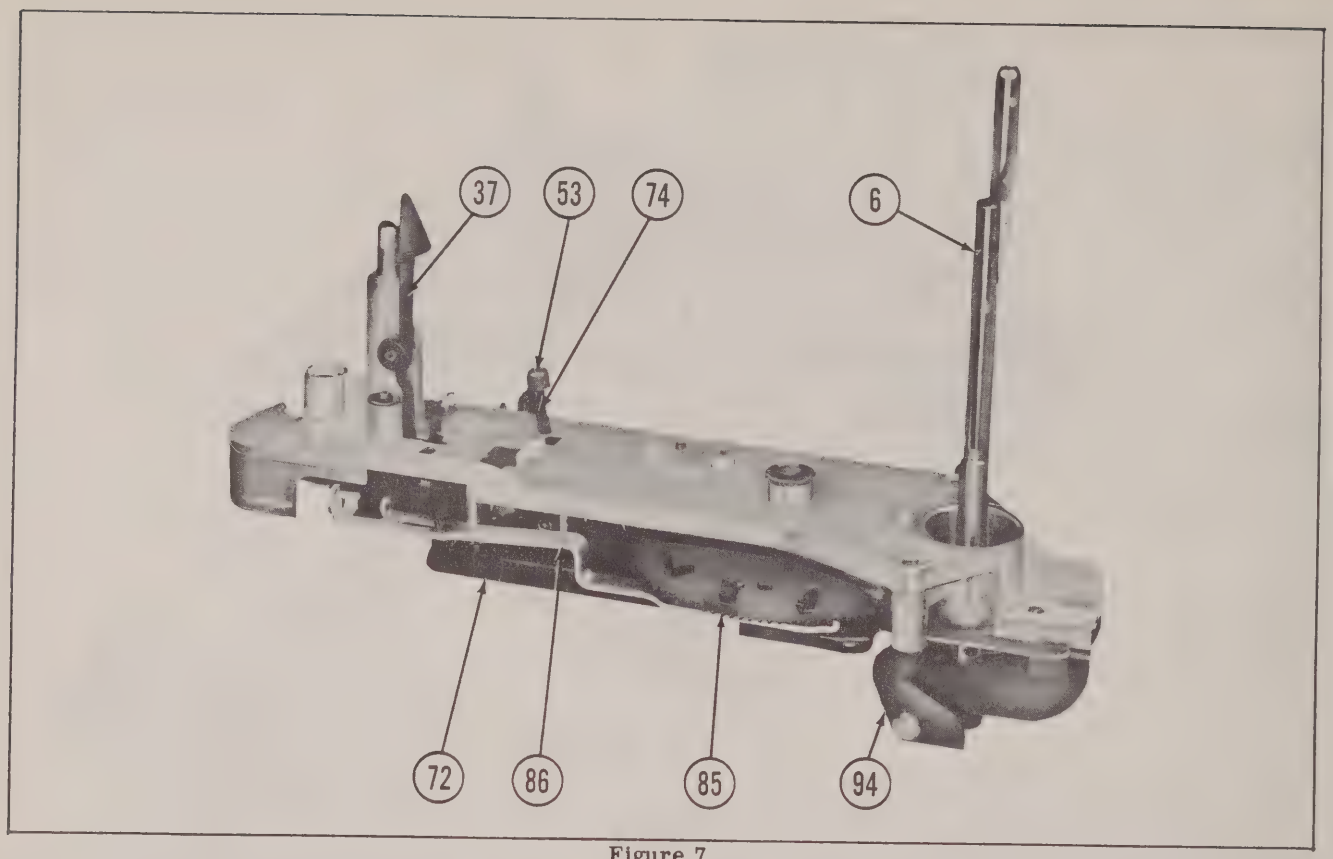

Figure 7

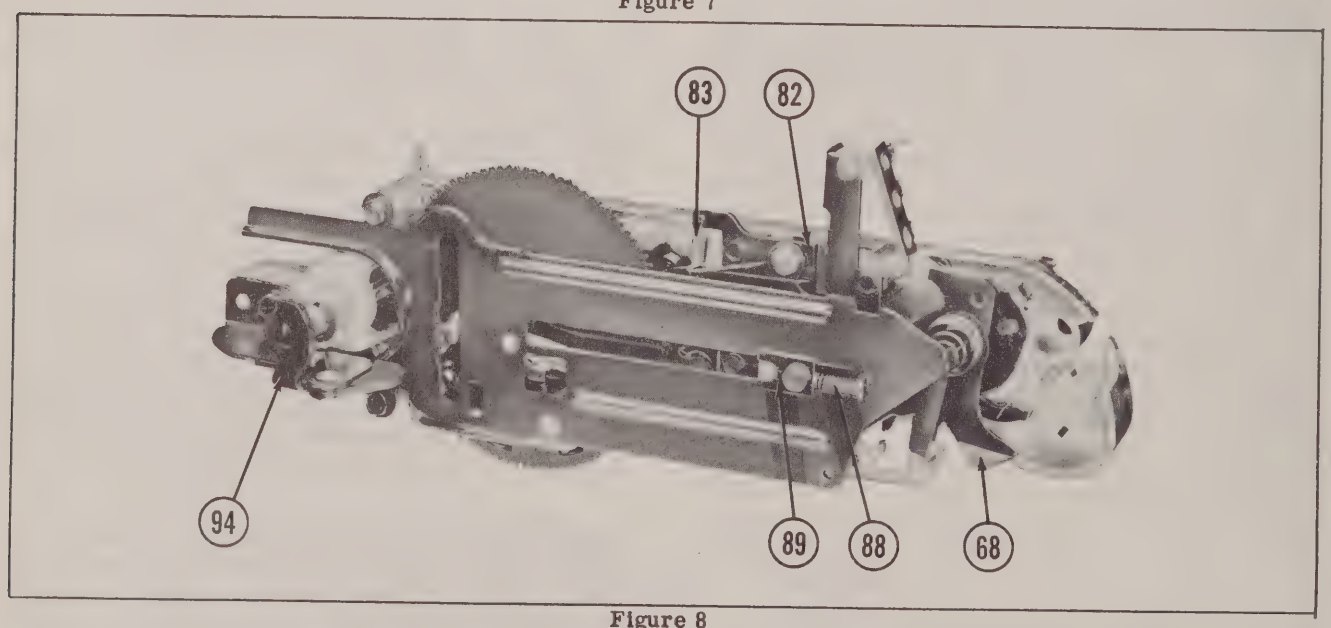

Figure 8

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high-operating temperature, the changer should be lubricated as follows: (Refer to the exploded view).

Apply Andok "B" or Texaco Sta-Put to:

1. Edges of all slots in slide assembly (72).

2. Outer edges of tines on forked end of slide assembly (72).

3. Lift pin cam surface on slide assembly (72).

4. Lower surface of pick-up arm return locator (64).

5. Inner surface of tab on rear of slide assembly (72).

Apply a small quantity of light mineral oil to:

1. Trip finger cam shaft (68).

ADJUSTMENTS

Needle Set-Down (Refer to Figure 4)-

The set-down position of the needle is adjusted by means of the set-down adjustment screw (36A) mounted on the hinge arm assembly (36). Turn this screw adjusting pick-up arm for correct set-down on a 10" record. When the correct set-down is obtained for the 10" position, the 12" and the 7" needle set-down will also be correct.

Pick-up Arm Height (Refer to Figure 4)-

The pickup arm height is adjusted by the lift screw (22). To raise the height of the pick-up arm , turn this screw counterclockwise. To lower the pick-up arm, turn clockwise. The pick-up arm height should be adjusted so that with a 1 1/8" stack of records on the turntable the pick-up arm lifts 1/4" straight up as the change cycle starts.

Needle Pressure (Refer to Figure 4)-

The needle pressure should be between 8 and 10 grams. Adjustment is made by placing weight adjusting spring (24) in the slots, on the underside of the pick-up arm, which give the desired pressure.

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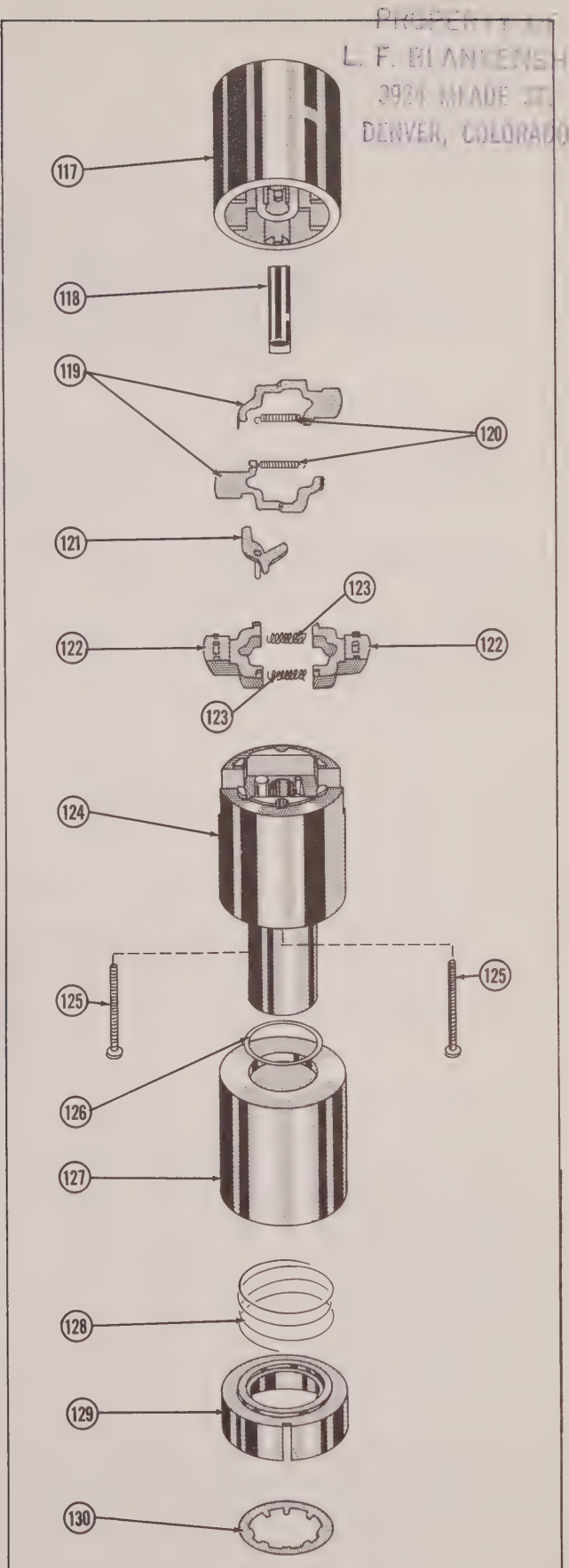

A PHOTOFACT "EXPLODED" VIEW
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Exploded View Of 45 RPM Spindle.

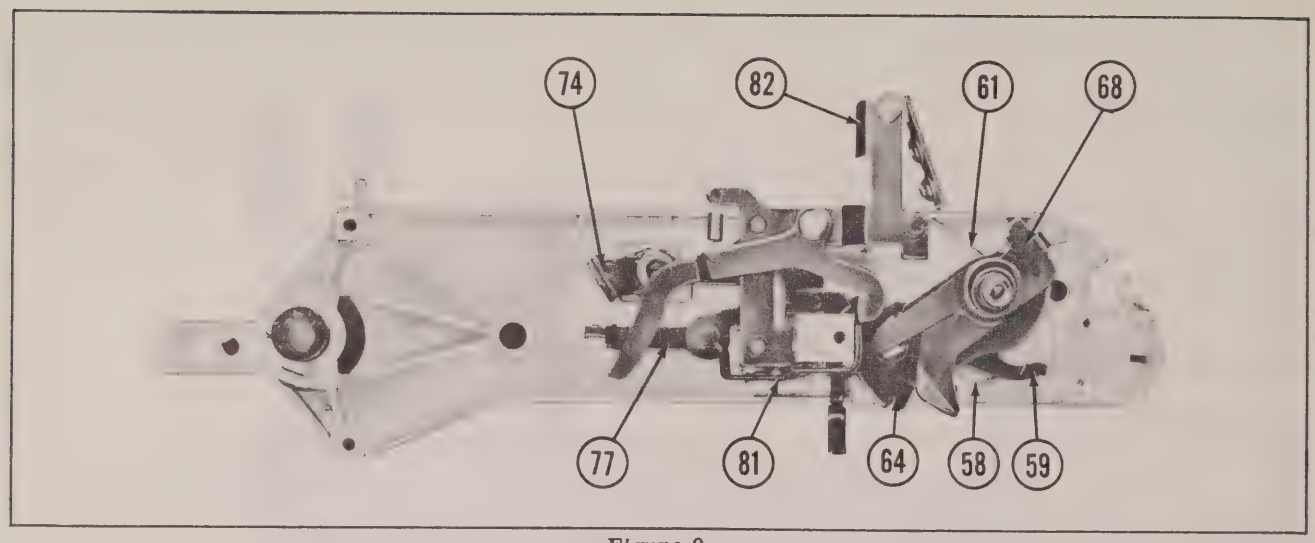

Figure 9

TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
Turntable does not revolve when control is turned to "On".	1. No current at motor.	(a)Check that current is reaching AC leads of changer.
		(b)Check that switch is closing.
		(c)Check wiring and soldered terminals in the changer.
	2. Motor defective.	(a)Remove turntable to allow motor to operate without load. If current is reaching motor and drive spindle does not rotate, the motor is defective. Repair or replace.
	3. Motor idler wheel not engaging turntable rim.	If drive spindle is turning but turntable is not: (a)Check motor idler assembly to determine if it is free to contact the drive spindle and turntable rim. (b)Wipe off the inside rim of the turntable (2) to remove flock, or if oily, clean the turntable rim and rubber tire of the idler wheel with naptha or alcohol.
	4. Motor not in detent completely.	Check speed change slide for freedom of operation.
Changer does not cycle when the control knob is turned to the "Rej".	1. The manual reject not actuating the trip.	(a)Turn the control knob (38) to the reject position, hold and see that the control shaft assembly (59) has moved the trip link (86) to the rear. This should actuate the trip pawl on the main gear (85) which will bring the spur on the trip pawl in contact with the hub gear on the turntable hub. (b)Check for binding of the pawl lever (103), the trip lever assembly (105) and the trip pawl. If binding occurs clean out all foreign matter and check for freedom.
Control knob cannot be turned to "On" position.	1. Machine shut off during cycle.	Turn the turntable clockwise, by hand, until the control knob (38) is free.
Pickup arm strikes records on spindle when it raises, or pickup arm rest when it moves out.	1. Pickup arm height not adjusted properly.	(See instructions for adjusting pickup arm height under "Adjustments").

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SYMPTOM	CAUSE	REMEDY
Turntable speed too slow (refer to exploded view).	1. Binding in turntable bearing.	Check the turntable bearing for freedom. Hold the motor idler wheel out of engagement with the turntable and spin the turntable, by hand, to see if it turns readily and coasts for a long time. If binding occurs, remove turntable, clean off foreign matter, and lubricate with light mineral oil.
	2. Line voltage too low.	The line voltage should not be less than 105 volts or the turntable may be too slow.
Turntable stalls or slows down during cycle; refer to exploded view.	1. Motor idler not engaging turntable.	1. (See "Turntable Does Not Revolve When Control Knob is Turned to "On" Position").
	2. Binding in drive mechanism.	Hold idler away from turntable, or remove idler wheel. Cycle machine by turning turntable slowly by hand. The main gear should turn freely for the complete revolution without binding at any point. (a)If binding occurs, check for foreign matter in the gear teeth, a bent gear bearing, or bent spindle bushing. Straighten or replace. Clean lubricate.
	3. Binding between pick-up arm lift pin (35) and lift pin cam surface on slide and cam assembly.	Lift pin should ride freely on cam surface without binding.
	4. Motor weak.	When everything checks all right, but the changer still stalls in cycle, the motor may be weak.
	5. Grease on idler wheel.	1. Wipe off idler wheel rubber tire; inner rim of turntable and pulley tires with naptha or alcohol.
	6. Idler wheel tension spring weak.	Replace spring or bend motor tension spring anchor bracket to give desired tension.
Changer continues to cycle.	Reject mechanism binding.	(a)Make certain the trip link (86) is not frozen in the reject position. (b)Make certain the changer control lever (59) is not binding and that it actuates the trip link (86) when the changer control knob (38) is turned to reject. (c)Check for binding of trip pawl, trip lever (105) and pawl lever (103); these must be free to turn easily. (d)Check the changer control linkage, (55) and (59).
Noise during playing of record.	1. Motor rumble.	If a low-pitched rumbling sound comes from the loud speaker while a record is being played, check motor grommets to be sure the motor is freely suspended on them. The motor lead wires should have slack to allow the motor to float. Motor rumble may also come from an unbalanced motor rotor; in this case, replace the motor.
	2. Defective turntable bearings (5).	Defective turntable bearings can cause rumble. Check for foreign matter in the bearing, defective balls, binding between balls and ball retainer; rough surface on washers. Clean ball bearing, sleeve bearing, and washers; lubricate with light mineral oil.
	3. Defective motor idler wheel.	A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel. If this condition does not clear up after ten minutes of running time, remove the turntable and check the rubber tire on the id-

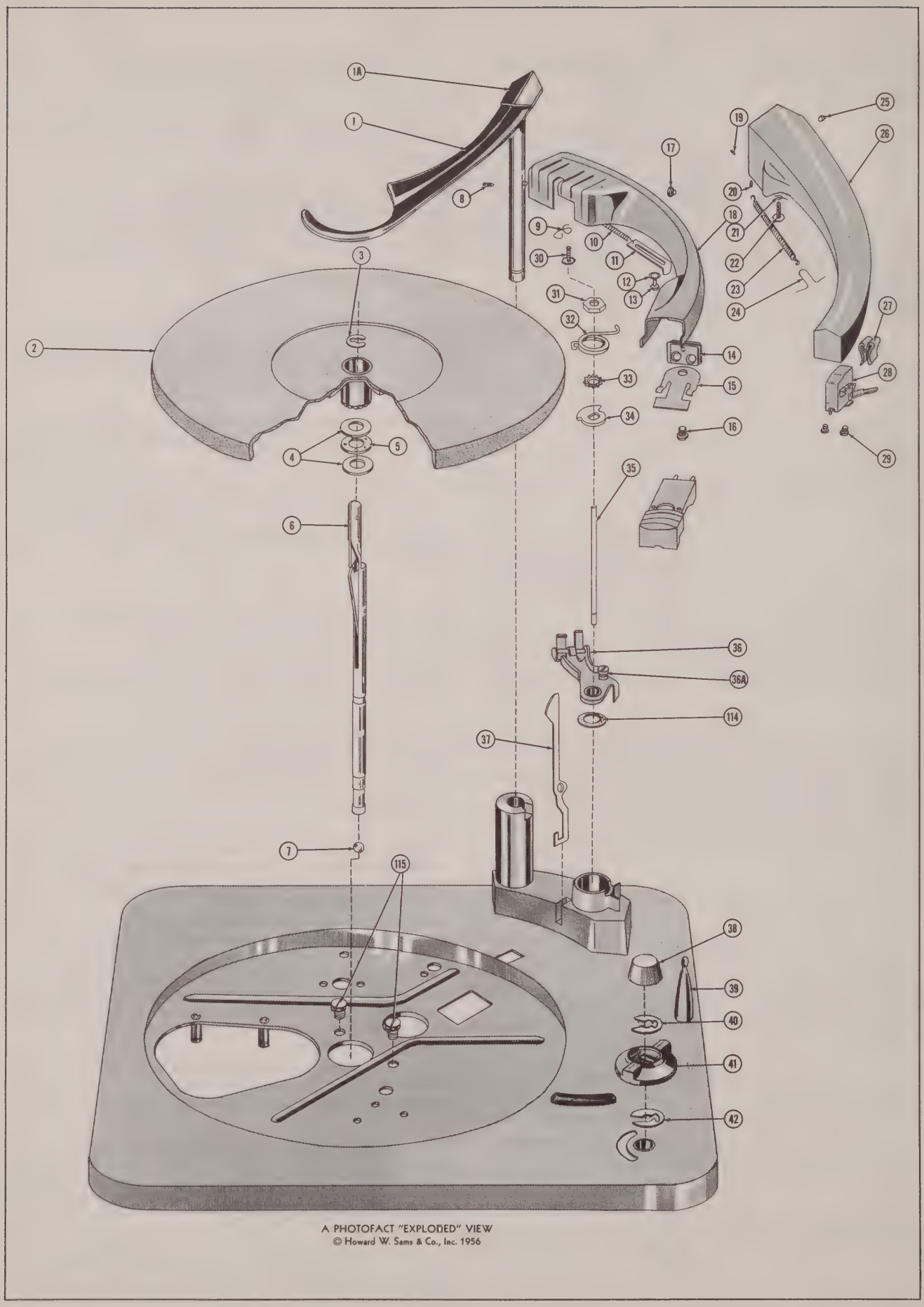

Figure 10A. Exploded View Of Parts Above Baseplate.

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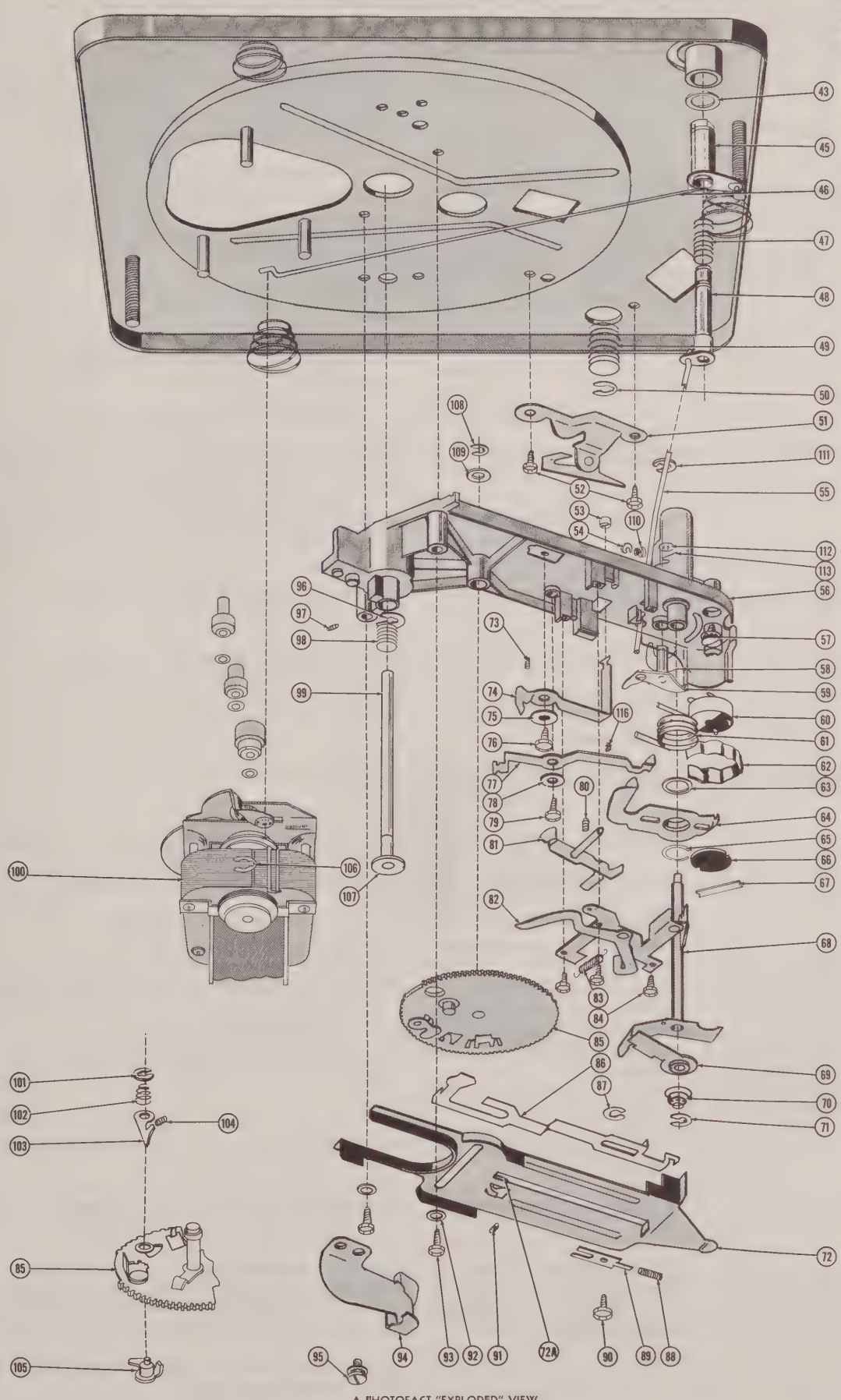

Figure 10B. Exploded View Of Parts Below Baseplate.

TROUBLE CHART-Con't.

SYMPTOM	CAUSE	REMEDY
		ler. If the surface of the rubber tire is not smooth and even, replace the part. Should the bearing of the idler wheel show signs of excessive wear or be extremely wobbly, the idler wheel should be replaced.
	4. Defective record.	Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records causing "Wow" (a waver in the recorded sound). An enlarged hole in the record can also cause "Wow".
	5. Turntable scrapes.	If a scraping sound occurs as the turntable revolves, check: (a)Turntable warped, causing outer rim to rise and fall. (b)Motor idler or mounting plate bent.
	6. Squeaks.	Squeaking sound as changer operates indicates lack of oil. Lubricate points indicated under "Lubrication".
	7. 7" lever (74) loose.	Check 7" lever washer (75) and screw (76) to see if they are tight.
Distortion of recorded sound.	1. Defective record.	(See "Noise During Playing of Record").
	2. Defective amplifier.	Check phonograph amplifier and speaker.
	3. Bad Cartridge.	Replace.
	4. Bad Needle.	Replace.
No Sound During Playing.	1. Defective cartridge.	Replace.
	2. Defective wiring.	Check pickup leads for a shorted or open lead.
	3. Defective amplifier.	Check phonograph amplifier and speaker.
	4. Loose cartridge terminal clips.	Remove, squeeze together slightly, and replace.
Excessive record wear.	1. Binding on pickup arm.	(See "Needle Does Not Track Across Record Properly").
Changer does not shut off after last record has been played (refer to exploded view).	1. Record support binding (1).	The record support must drop below the off-set shoulder of the spindle or the changer will not shut off.
	2. Lever assembly binding (81).	Clean out dirt and make sure this operates smoothly.
	3. Shut-off bracket binding.	Check bracket and if bent, straighten.
	4. Shut off lever not engaging locator.	Adjust tab on slide that rotates the locator and trip finger when unit is cycling.
Rough pickup arm motion.	1. Horizontal defects	(a)Check pickup arm return locator (64) for tightness. (b)Check that pickup arm return spring (61) is not weak and is hooked up properly. (c)Check that fiber washer (63) is installed under pickup arm return locator.

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SYMPTOM	CAUSE	REMEDY
	2. Vertical defects.	(a)Lift pin (35) binding; clean out dirt and lubricate. (b)Slide and cam (72) binds; check bearing points--clean and lubricate. (c)Burrs in main slot in slide and cam (72)--remove with fine file. (d)Ejector lever on ejector bracket assembly (94) binding straighten, remove burrs, and lubricate. (e)Pickup arm shaft and sleeve binding; clean and lubricate.
Noise during change cycle.	1. Tines on the forked end of the slide and cam assembly (72) bent.	Replace.
	2. Lack of lubrication. Grinding noise.	Lubricate ejector lever (94) where it contacts lower end of spindle (99).
Control knob does not detent on "33", "45", or "78" positions.	1. Detent spring off or broken.	Replace.
Cartridge drags on record.	Needle bent.	Replace needle.
	Cartridge mounting screws loose.	Tighten.
Shuts off when last record drops.	1. Shut-off bracket (51) bent.	Straighten or replace.
	2. Record support bent.	Bend down slightly so record support (1) is parallel with the base plate.
	3. Loose shut-off lever assembly (81).	Tighten.
Will not play manually.	1. Trip link (86) bent.	Straighten or replace.
	2. Trip finger cam (68) bent.	Straighten or replace.
Impossible to adjust set-down.	1. Pickup arm shaft and sleeve assembly (68) defective.	Shift the safety plate (34) toward the eccentric set-down adjusting screw (36A) and tighten pickup arm shaft and sleeve nut (31). Hold pickup arm against rear stop and push on trip finger cam (68). The safety plate (34) should move away from the set-down adjusting screw (36A) and snap back when the trip finger cam (68) is released; if it does not, replace the pickup arm shaft and sleeve assembly (68).
Record does not drop when changer cycles.	1. Spindle pusher shaft (99) broken, or bent.	Replace push shaft (99).
	2. Record finger in spindle not moving far enough to eject a record.	The record finger should move forward until it has reached a point flush with, or a maximum of, .010 beyond the spindle body (6). To insure that the record finger is all the way forward, push rod (99) should be raised high enough by the ejector lever to slightly compress the pusher spring. (See Turntable Stalls During Cycle"). If the spring is compressed and the record finger does not move far enough forward to eject a record, the spindle (6) should be

SYMPTOM	CAUSE	REMEDY
		replaced. If a record is not pushed completely off the ledge it may hang on the spindle momentarily, then drop on the pickup arm when it moves in over the turntable.
	3. Check that ball bearing (7) is not missing.	Replace.
Two records drop at once.	1. Hole in record too large.	Check the diameter of the hole in the record. An oversize hole will cause two records to drop at once.
	2. Spindle guide not fully down.	If the spindle guide is not all the way down, more than one record may be dropped at a time.
		(a)Check the guide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten if necessary. Do not oil.
		(b)When records are placed on the spindle, be sure the guide is all the way down. The guide will normally raise as a record is being dropped, but it should return to place immediately, by gravity.
	3. Record pusher (99) defective.	The record pusher (99) may be deformed, etc. This may cause two records to drop at once. Replace with new pusher or replace spindle assembly.
	4. Slight play in spindle (6).	Tighten spindle set screw (97).
Record hits pickup arm (refer to exploded view).	1. Record finger not moving far enough forward to eject record.	(See "Record Does not drop when changer cycles").
	2. Record finger extending beyond outside diameter of spindle.	Cycle changer, by hand, until pusher shaft is at the top of its travel. Using new record as a gauge, pass it over the spindle to see if it binds at any point. File off high points on record finger with a fine file, until record will pass freely over spindle.
	3. Pickup arm not adjusted properly.	(See "Adjustments").
Needle does not set down on 10" record in proper position (refer to exploded view).	1. Pickup arm not adjusted properly.	(See "Adjustments").
		(a)Loose nut (31) on pickup arm shaft and sleeve (68).
	2. Pickup arm shaft and sleeve (68) binding.	File off burrs and rough surfaces. Polish and lubricate shaft.
	3. 7" set-down lever (74) and 12" record selector (37) not operating properly.	Insure that the proper operation and reset of the 7" set-down lever (74) and 12" record selector (37) is not being interferred with.
	4. Needle bent.	Replace with new needle.
	5. Wire spring (113) broken.	12" record selector (37) does not cock; check for broken 12" record selector spring (113).
	6. Bent pickup arm return locator (64).	Straighten or replace.
	7. Bent trip finger cam (68).	Straighten or replace.

TROUBLE CHART-Con't.

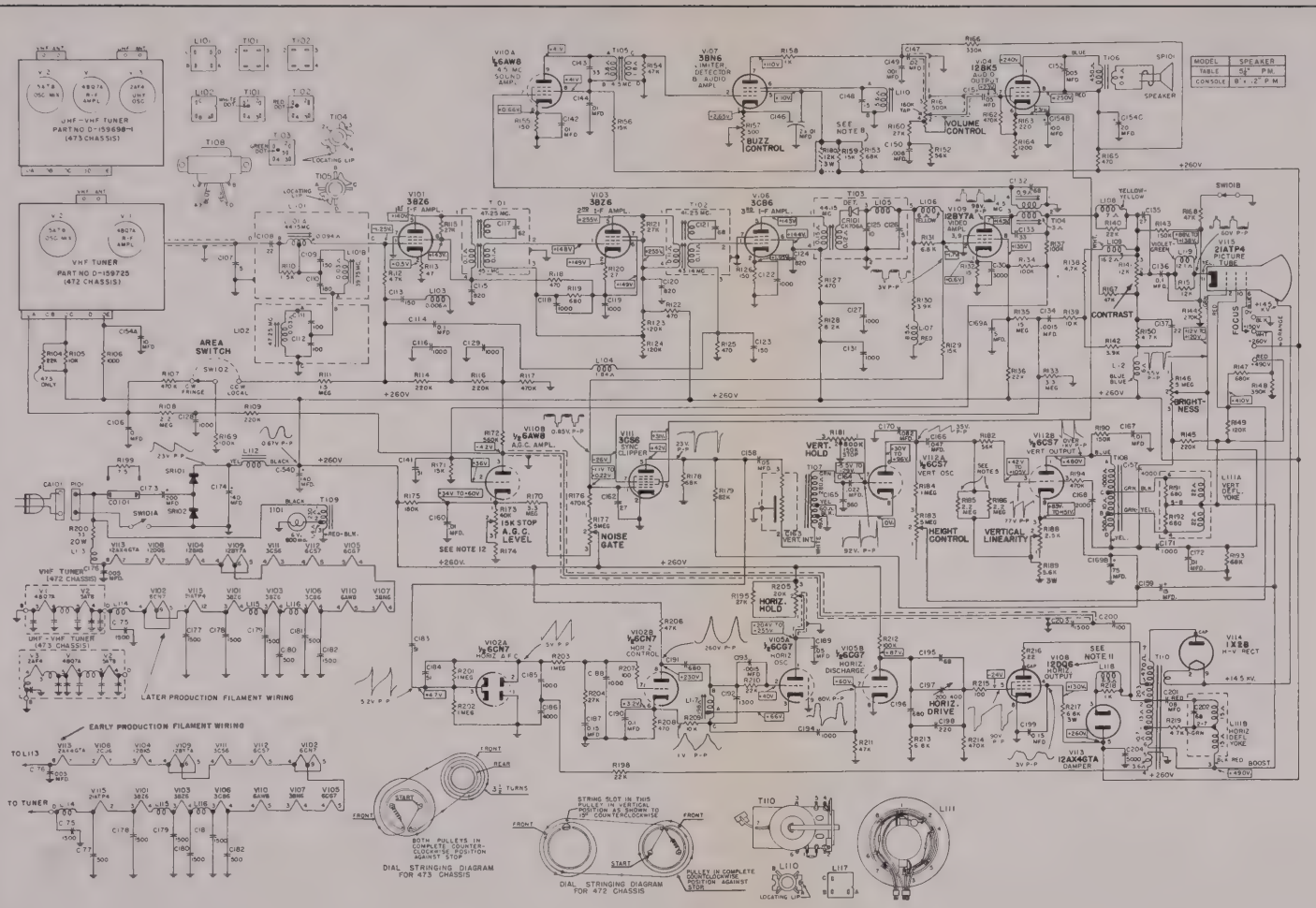
SYMPTOM	CAUSE	REMEDY
Needle does not set down on 12" record in proper position (refer to exploded view).	1. Diameter of 12" record undersize.	The set-down position of the needle for 12" records is determined by the edge of the record striking the 12" record selector (37). If a 12" record has a diameter of less than the standard size of 11-7/8" plus or minus 1/32" it may fail to depress the 12" record selector far enough.
	2. Enlarged center hole in record.	An enlarged center hole might fail to set the 12" record selector because it could produce the same effect as a small record.
	3. Pickup arm not adjusted properly.	(See "Adjustments") Page 7.
	4. Binding of pickup arm shaft and sleeve (68).	Clean and polish shaft (68) and lubricate with light oil.
	5. Reset lever spring (116) broken.	Replace spring (116).
	6. 12" record selector spring (113) broken.	Replace spring (113).
	7. 12" record selector (37) binding.	The 12" record selector must be free to operate smoothly. Clean out dirt and straighten if bent, or replace.
	8. Bent pickup arm return locator (64).	Straighten or replace.
	9. Bent trip finger cam (68).	Straighten or replace.
Needle does not set down on 7" record properly.	1. 7" set-down lever spring (73) broken or weak.	Replace.
	2. Pickup arm not adjusted properly.	(See Adjustments) Page 7.
	3. 7" set-down lever screw (76) loose.	Tighten.
	4. 7" set-down lever (74) hitting frame or baseplate where it goes through hole in frame.	Straighten or replace.
	5. Reset lever (77) bent.	Replace.

PART LIST

Ref. No.	Part No.	Description		Ref. No.	Part No.	Description	
1	5582-B	Record Support Assembly		15	6131	Cover Plate	
1A		2903-G Plastic Knob		16	2932	Screw-#4 Self Tapping	
2	5116-A	Turntable and Hub Assembly		17	3602	Hinge Button Bearing	
3	1650-	"C" Washer-Turntable Retainer		18	6594-C	Tone Arm (Metal)	
4	6877	Bearing Washers			7505	Tone Arm and Hinge Assy.,	
5	6876	Ball Bearing Retainer				Consists of:	
6	6049	Spindle Shaft		19		4923 Pivot Screw	
7	6884	Ball Bearing		20		6001 Pivot Lock Screw	
8	4923	Hinge Pivot Screw		21		7634 Lock Spring	
9	2255	Lock Spring		22		7635 Lift Screw	
10	6203	Tone Arm Weight Adj. Spring		23		6924 Hinge Spring	
11	6114	Adjusting Slide-Weight		24		6965 Adjusting Spring	
12	6253	Lock Washer		25		4922 Hinge Pivot Button	
13	6738	Weight Adjusting Screw		26		7884A Tone Arm	
14	2720	Tone Arm Socket		27		6963 Tone Arm Clip	

PARTS LIST-Con't.

Ref. No.	Part No.	Description		Ref. No.	Part No.	Description	
28		7477 Cartridge (Sonotone 9980)		92	2274	Flat Washer	
29		9074 Screw-#2-56 x 1/8 Phillips Fillister Hd.		93	4856	Screw-#6-32 x 1/4	
				94	6953	Ejector-Bracket Assembly	
30	2912	Lift Screw		95	101	Screw-#10-24 x 5/16	
31	3887	Jam Screw		96	5022	"C" Washer	
32	4937	Safety Spring		97	6955	Set Screw-#8-32 x 1/4	
33	3888	Lockwasher		98	6885	Safety Spring	
34	4339	Safety Plate		99	6874	Push Rod	
35	4327	Lift Pin		100	7340	Alliance Motor	
36	4072	Hinge Assembly				2765 Lever Grommet	
36A		Set-Down Adj. Screw (Part of Item 36)				3486 Idler Arm Link	
						3488 "C" Washer	
37	2957	12" Selector				3489 Mounting Grommet	
38	2907-G	Reject Knob				3491 Felt Washer-Idler	
39	5573-G	Tone Arm Post				3492 Fibre Washer-Pulley	
40	1651	"C" Washer-Switch Control				3493 Fibre Washer-Idler	
41	4503-G	Speed Control Knob				5368 Upper Bearing Assy.	
42	2594	"C" Washer-Switch Control				5495 Pulley Latch Spring	
43	2909	Washer				5496 Shifter Latch Spring	
45	2597	Control Shaft Assembly-Motor				5497 Washer-Blued Steel	
46	3836	Motor Speed Control Rod				3481 Idler Wheel	
47	2910	Compression Spring				3482 "33 1/3" Pulley	
48	2599	Switch Control Lever Assembly				3483 "45" Pulley	
49	2546	Spring-Record Support				3484 "78" Pulley	
50	2110	"C" Washer-Record Support			5686	General Industries Motor	
51	5583	Shut-Off Bracket Assembly				2772 Idler Wheel	
52	2053	Screw-6 x 5/16				6189 Idler Arm Tension Spring	
53	2580	Rubber Bumper					
54	1588	"C" Washer for Item 110				6170 Idler Wheel Arm Assembly	
55	6919	Reject Rod					
56	6968	Die-Cast Frame				3139 Pulley 78 RPM	
57	101	Screw-#10-24 x 5/16				3140 Pulley 45 RPM	
58	3901	Reject Spring				3141 Pulley 33 1/3 RPM	
59	2284	Control Shaft Assembly		101	1588	"C" Washer	
60	467	Switch		102	4172	Spring	
61	4938	Return Spring-Pick-up Arm		103	5339	Pawl Lever	
62	2931	Fibre Insulating Strip		104	5338	Pawl Spring	
63	4950	Fibre Washer		105	2569	Trip Lever Assembly	
64	6405	Locator and Bushing Assembly		106		"C" Washer	
65	5828	Retainer Ring-Locator Plate		107	6883	Thrust Washer	
66	2573	Switch Cover		108	1719	"C" Washer-Main Gear Assy.	
67	4212	Retainer-Switch Cover		109	2221	Washer, Fibre	
68	6892	Trip Finger Cam and Shaft Assy.		110	4172	Compression Spring	
69	6879	Retard Lever		111	1652	"C" Washer	
70	6882	Lift Pin Spring		112	1720	Speed Nut	
71	1588	"C" Washer		113	2563	Spring-12" Record Selector	
72	6970	Slide Assembly		114	2952	Fibre Washer	
73	2579	Spring-7" Set Down Lever		115	101	Screw-10-24 x 3/8 Sems BH	
74	2581	7" Set Down Lever		116	2925	Spring-Reset Lever	
75	2274	Flat Washer-7" Set-Down Lever			6100	45 RPM Spindle-New Type	
76	4856	Screw-#6-32 x 1/4				Consists of:	
77	6007	Reset Lever		117		6104-A4 Spindle Cap	
78	492	Flat Washer-Reset Lever		118		6097 Spindle Clamp	
79	4856	Screw-#6-32 x 1/4		119		6089 Separator Blade	
80	2925	Spring-Reset Lever		120		6093 Bolt Return Spring	
81	6966	Shut-Off Lever Assy.		121		6102 Actuator Lever Assy.	
82	6890	Muting Switch Bracket Assy.		122		6088 Bolt	
83	6880	Spring-Retard Arm		123		6093 Bolt Return Spring	
84	6713	Screw-#4-40 Hex. Hd.		124		6087 Spindle Body	
85	6967	Gear Assembly		125		5245 Screw, 4-40 x 7/8Fil. Hd. M. S.	
86	4656	Trip Link					
87	1588	"C" Washer		126		6094 Fibre Washer	
88	2246	Spring-Slide Bearing		127		6096 Rotor	
89	2211	Slide Bearing		128		5068 Spring-Rotor Lift	
90	4856	Screw-#6-32 x 1/2		129		6095 Rotor Lift	
91	2585	Spring-Escape Lever		130		6099 Retainer	



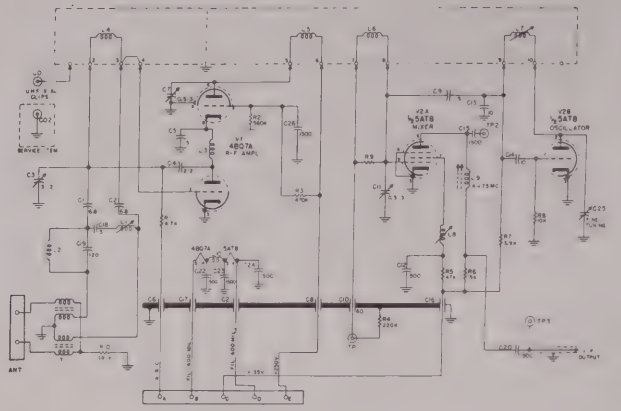
Schematic - Courtesy Crosley Division Avco Mfr. Corp.

PROPERTY
L. F. P.
DENVER, COLORADO

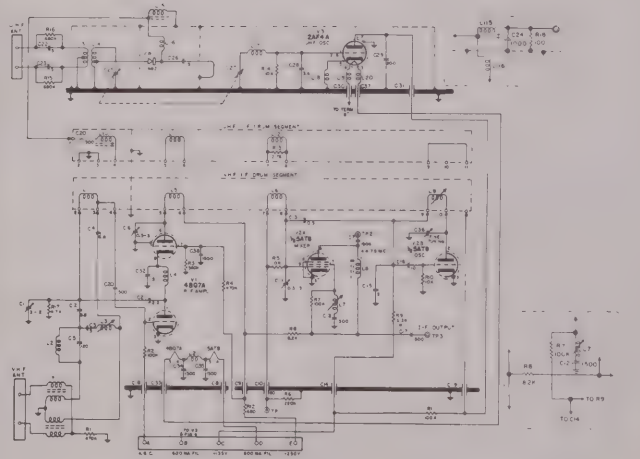
CROSLEY MODELS

J-21CKBF	Ch. 472
J-21CKBU	Ch. 473
J-21CKMF	Ch. 472
J-21CKMU	Ch. 473
J-21LKBF	Ch. 472
J-21LKBU	Ch. 473
J-21TKBF	Ch. 472
J-21TKBU	Ch. 473
J-21TKLBF	Ch. 472
J-21TKLBU	Ch. 473
J-21TKLMF	Ch. 472
J-21TKLMU	Ch. 473
J-21TKMF	Ch. 472
J-21TKMU	Ch. 473

Part No. 159725-1



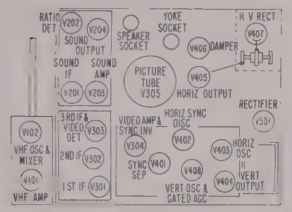
Part No. 159698-1



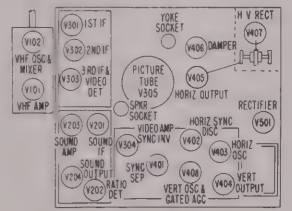
ADMIRAL MODELS

C23B1	Ch. 20Y4E	F25B6	Ch. 20Y4F
C23B2	Ch. 20Y4E	F25B7	Ch. 20Y4F
C23B3	Ch. 20Y4E	T23B1	Ch. 20Y4L
C23B16	Ch. 20Y4E	T23B2	Ch. 20Y4L
C23B17	Ch. 20Y4E	T23B6	Ch. 20Y4L
C23B18	Ch. 20Y4E	T23B7	Ch. 20Y4L
C23B26	Ch. 20Y4E	T23P16	Ch. 20Y4B
C23B27	Ch. 20Y4E	T23B17	Ch. 20Y4B
C25B6	Ch. 20Y4F	T23B18	Ch. 20Y4B
C25B7	Ch. 20Y4F	T23B26	Ch. 20Y4L
C25B8	Ch. 20Y4F	T23B27	Ch. 20Y4L
F23B6	Ch. 20Y4E	T25B26	Ch. 20Y4F
F23B7	Ch. 20Y4E	T25B27	Ch. 20Y4F

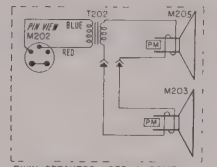
Rear View 20Y4B Chassis.



Rear View 20Y4E, 20Y4F, 20Y4L Chassis.



V101—6BC8		V304—6AW8	V403—12AU7
V102—6J6		21ALP4A	V404—6S4
V201—6AU6		(20Y4B,	V405—6CU6
V202—6AL5	V305	20Y4E,	V406—6AU4GT
V203—6AV6		20Y4L)	V407—1B3GT
V204—6BF5		24DP4A	V408—6BH8
V301—6BZ6		(20Y4F)	V501—5U4GA
V302—6BZ6		V401—6CS6	or
V303—6AM8		V402—6AL5	5U4GB



SCHEMATIC NOTES

①, ②, . . . indicate production changes covered by a Run number. Run numbers are rubber stamped on the chassis.

Ⓐ1, Ⓐ2, ... Ⓨ, Ⓩ, etc. indicate alignment points and alignment connections.

Fixed resistor values shown in ohms ± 10% tolerance, ½ watt; capacitor values shown in micromicrofarads ± 20% tolerance unless otherwise specified.

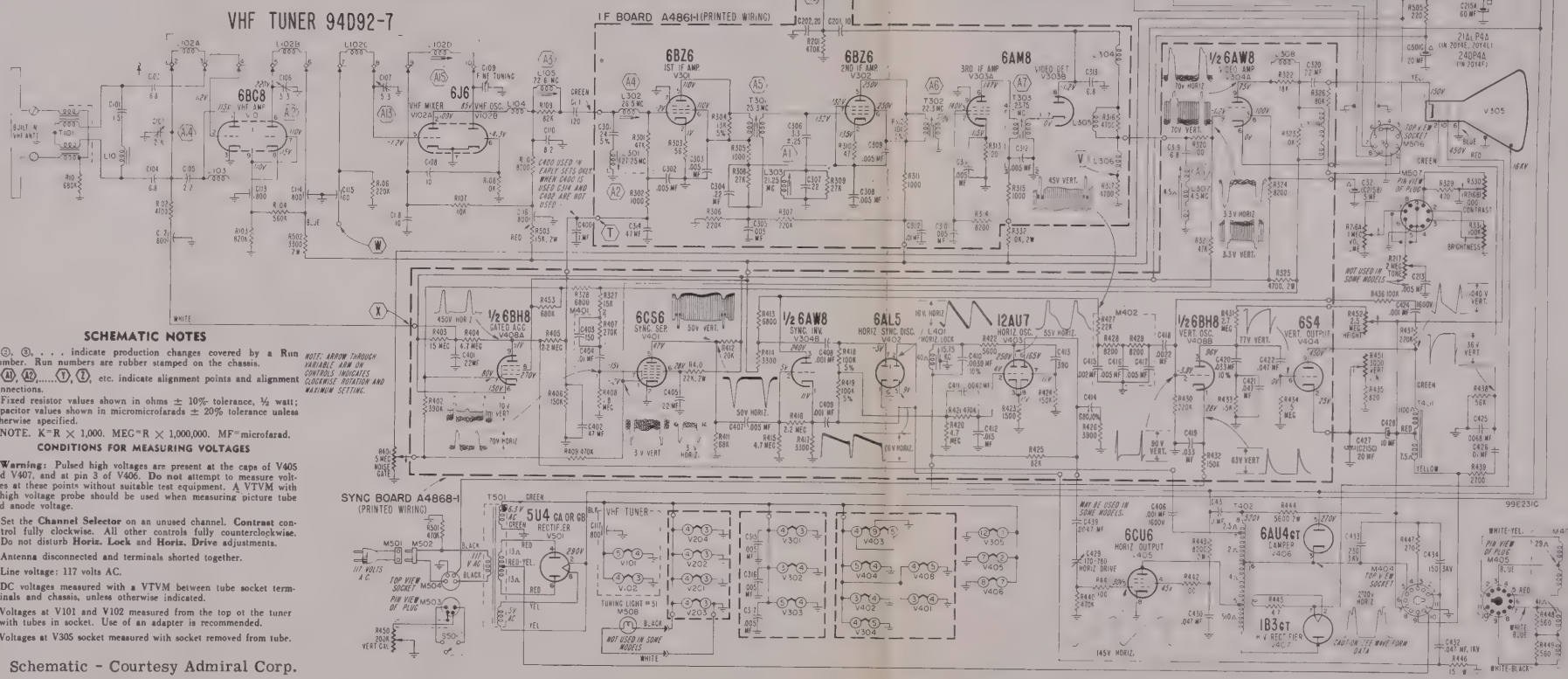
NOTE. K=R × 1,000. MEG=R × 1,000,000. MF=microfarad.

CONDITIONS FOR MEASURING VOLTAGES

Warning: Pulsed high voltages are present at the caps of V405 and V407, and at pin 3 of V406. **Do not** attempt to measure voltages at these points without suitable test equipment. A VTVM with a high voltage probe should be used when measuring picture tube 2nd anode voltage.

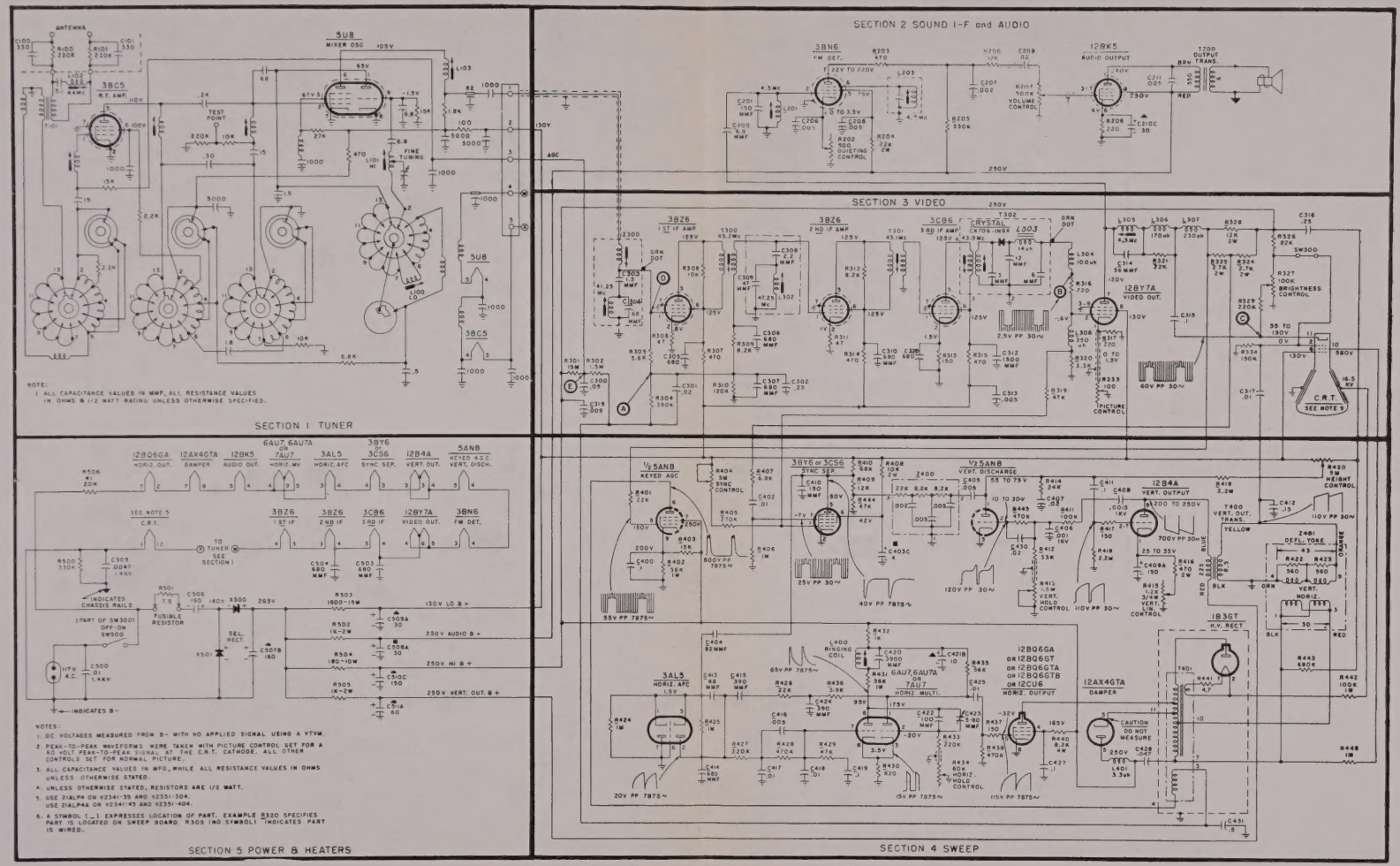
- Set the **Channel Selector** on an unused channel. **Contrast** control fully clockwise. All other controls fully counterclockwise. Do not disturb **Horiz. Lock** and **Horiz. Drive** adjustments.
- Antenna disconnected and terminals shorted together.
- Line voltage: 117 volts AC.
- DC voltages measured with a VTVM between tube socket terminals and chassis, unless otherwise indicated.
- Voltages at V101 and V102 measured from the top of the tuner with tubes in socket. Use of an adapter is recommended.
- Voltages at V305 socket measured with socket removed from tube.

Schematic - Courtesy Admiral Corp.

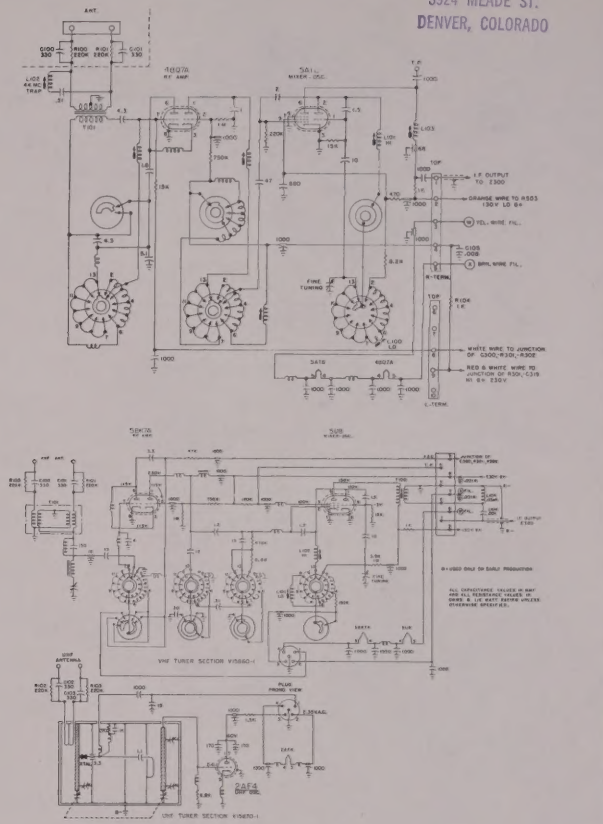


© Howard W. Sams & Co., Inc. 1956 SET 302 FOLDER 13-S

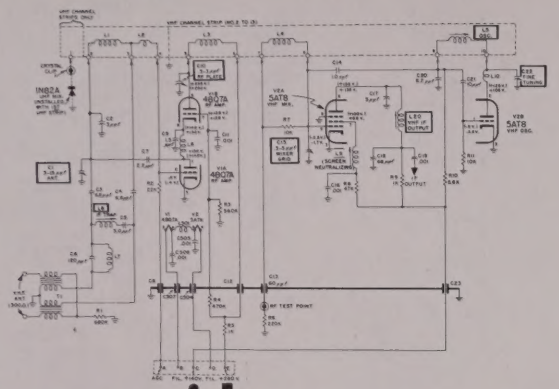
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



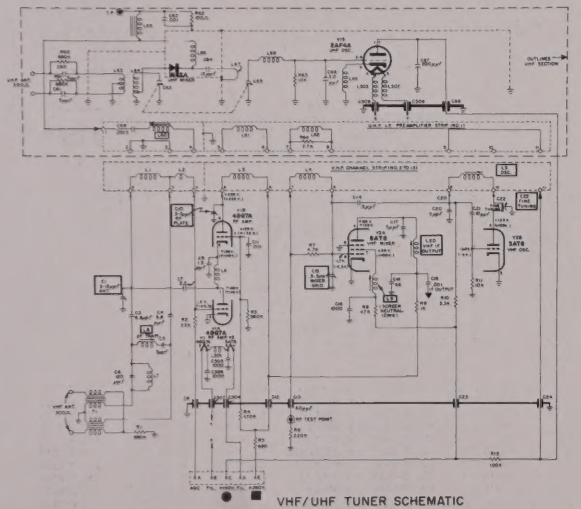
Schematic - Courtesy Westinghouse Elect. Corp.



WESTINGHOUSE MODELS		H-927T21C	Ch. V-2341	H-974TU21	Ch. V-2351
H-916T17A	Ch. V-2340	H-927TU21C	Ch. V-2351	H-975T21	Ch. V-2341
H-916TU17A	Ch. V-2350	H-928T21C	Ch. V-2341	H-975TU21	Ch. V-2351
H-919T17A	Ch. V-2340	H-928TU21C	Ch. V-2351	H-976T21	Ch. V-2341
H-919TU17A	Ch. V-2350	H-929T21C	Ch. V-2341	H-976TU21	Ch. V-2351
H-920T17A	Ch. V-2340	H-929TU21C	Ch. V-2351	H-978T17	Ch. V-2340
H-920TU17A	Ch. V-2350	H-965K21C	Ch. V-2341	H-978TU17	Ch. V-2350
H-921T17A	Ch. V-2340	H-965KU21C	Ch. V-2351	H-979T17	Ch. V-2340
H-921TU17A	Ch. V-2350	H-966K21C	Ch. V-2341	H-979TU17	Ch. V-2350
H-924T21A, C	Ch. V-2341	H-966KU21C	Ch. V-2351	H-980T17	Ch. V-2340
H-924TU21C	Ch. V-2351	H-974T21	Ch. V-2341	H-980TU17	Ch. V-2350



VHF TUNER SCHEMATIC



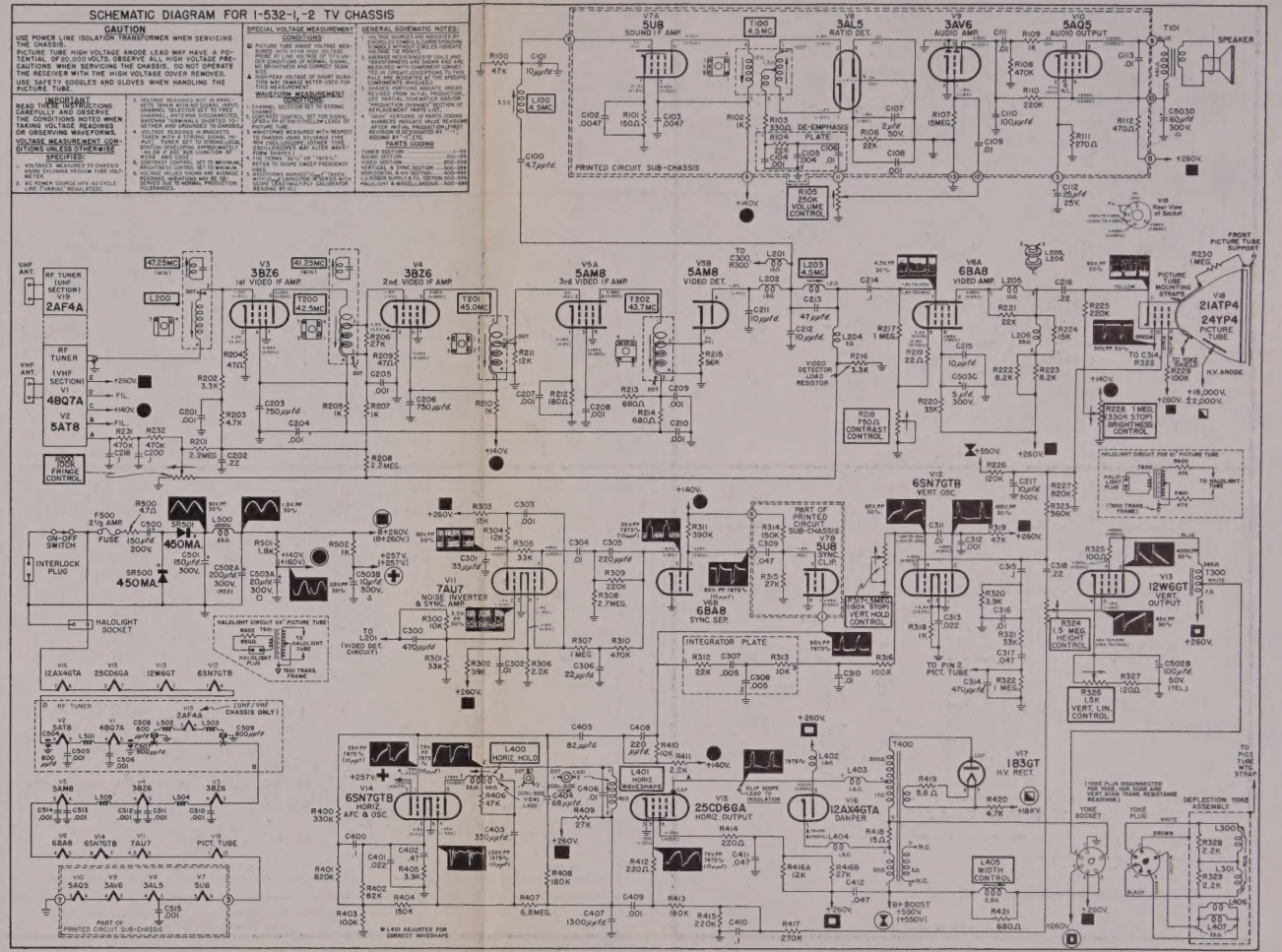
VHF/UHF TUNER SCHEMATIC

SYLVANIA MODELS

21C401 Series Ch. 1-532-1, -2
21C403 Series Ch. 1-532-1, -2
21T101 Series Ch. 1-532-1, -2
21T102 Series Ch. 1-532-1, -2
21T104 Series Ch. 1-532-1, -2
24T101 Series Ch. 1-532-1, -2

Schematic - Courtesy Sylvania Electric Products Inc.

SCHEMATIC DIAGRAM FOR 1-532-1, -2 TV CHASSIS



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